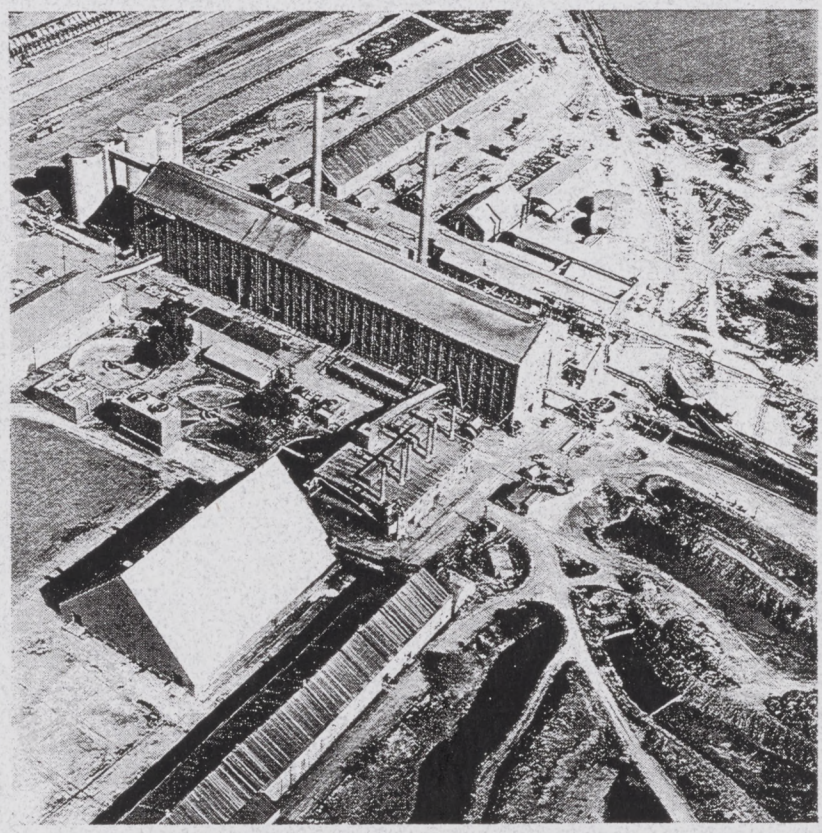
MODIFIED HABS/HAER REPORT

SPRECKELS SUGAR COMPANY FACTORY NO. 1

SPRECKELS, CALIFORNIA



VOLUME 1: TEXT

Prepared for:
Spreckels Sugar Company, Inc.
Pleasanton, California

Prepared by:
Page & Turnbull, Inc.
364 Bush Street
San Francisco, California

October 1993

TITLE PAGE

SPRECKELS SUGAR COMPANY
FACTORY NO. 1

Location:	121 Spreckels Boulevard 0.4 miles southwest of the Town of Spreckels Monterey County, California U.S.G.S. 7.5 minute Spreckels, California, quadrangle Universal Transverse Mercator coordinates: 10.620630.4053220
Date of Construction:	1897-99. Additions and alterations through 1982.
Engineer:	W. C. Waters, Chief Engineer
Builder:	J. B. McMahon, San Francisco, CA Risdon Iron Works, San Francisco, CA
Present Owner:	Spreckels Sugar Company 4256 Hacienda Drive Pleasanton, CA 94566
Present Use:	The Factory No. 1 complex was used to process beets into sugar. Most of the principal buildings on the site have been demolished. The remaining buildings are vacant or used for storage, with the exception of a sugar packaging facility which is still in operation.
Significance:	When built Factory No. 1 was the largest beet sugar factory in the world and it remained the country's largest for over sixty years. Through its imposing scale and architecture the factory evokes the industrial strength of the United States at the turn of the century. Factory No. 1 was significant in the local area as a catalyst for change in the agricultural patterns of the Salinas and Pajaro valleys. On the regional and national levels the complex illustrates the expansion of California agriculture and industry in the West. Taken together the factory site and surroundings symbolize an important American industrial landscape pattern—the peripheral factory as a center for an industry, a company town, transportation systems and related infrastructure.
Report Prepared By:	Page & Turnbull, Inc. 364 Bush Street San Francisco, CA 94104
Date:	October 1993

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FOREWORD

On December 22, 1992, Spreckels Sugar Company directed Page & Turnbull, Inc. to prepare documentation concerning five buildings within the company's Factory No. 1 complex in Spreckels, California, which are intended for demolition. The material gathered was required to be in the form of a report similar to those submitted to the Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER). HABS/HAER is a division of the National Park Service which serves as a repository of information concerning important American buildings and engineering structures. The HABS/HAER archives are in the Library of Congress.

For this documentation project, under an agreement between the Spreckels Sugar Company and the County of Monterey, the material is to be retained in local archives with informational copies provided to the State Office of Historic Preservation and the National Park Service. The extent and subject matter of the documentation was determined through negotiation with the Monterey County Historic Resources Review Board.

This study presents research and documentation on five buildings at the Factory No. 1 site which are to be demolished, namely:

- Main Building (No. 1)
- Boiler House and Annex Building (currently known as No. 2 and No. 2A), hereafter referred to as Boiler House (No. 2), Boiler House Addition and Extraction Plant portion of the Steffen and Extraction Building (No. 4)
- Lime Kiln Building, hereafter referred to as Room 2B of the Boiler House
- Pulp Dryer Building (No. 118)
- Carpenter Shops (No. 9 and No. 11), hereafter referred to as Carpenter Shop and Pipe Shop respectively

As required by the HAER standards, this report describes the buildings as originally designed, as altered over the years, and as they exist now. HAER standards also require documentation of the history and the context of buildings. In the case of these buildings the immediate context is the Factory No. 1 manufacturing complex itself. Beyond that, however, is the local context of the Spreckels Sugar Company operations in the Salinas and Pajaro valleys, including the beet ranches with their labor camps and irrigation systems, the railroad which originally tied the factory to the ranches and distant markets, and the Town of Spreckels. Still broader contexts include the sugar beet industry in the United States, and the sugar industry in the West which was largely developed by Claus Spreckels.

The report which follows is in four volumes: narrative text, photographs, drawings and an appendix volume of oral histories. To aid the reader in understanding the buildings and their significance, the narrative begins with a regional overview and descriptive history of the Factory No. 1 complex as a whole. Following that is a section on the architecture of selected factory buildings. A third section provides an introduction to sugar beet agriculture and a description of the industrial processes and equipment used at the factory. The fourth portion of the report discusses the ranches, housing and infrastructure related to the Factory No. 1 site, including patterns of migrant and immigrant labor. The narrative

concludes with sections which place the Factory No. 1 complex within its broader contexts and discuss the significance of the site and buildings.

Within the report Claus Spreckels, the Spreckels Sugar Company (and other variations of the company name, as appropriate) and the Town of Spreckels will be referred to by those terms if the reference is unclear from the context of the sentence. Thus "Claus Spreckels based the Spreckels Sugar Company in the Town of Spreckels" should be clearer than "Spreckels based Spreckels in Spreckels." All of the buildings on the Factory No. 1 site, and many in the Town of Spreckels, are referred to by both number and name, so in this report the historic name will be used along with any number in parentheses. For example, the largest building on the site will be called Main Building (No. 1). The entire grouping of sugar manufacturing buildings at the Town of Spreckels will be referred to as the Factory No. 1 site or complex (the primary building and the complex have both been commonly referred to as "Factory No. 1," but this nomenclature can be confusing and will be retained only when quoting other sources). By the time this report is published, many or all of the five subject buildings will have been demolished; for the sake of clarity, the report will describe their condition in late 1992, just before demolition, and will refer to them in the present tense. Only descriptions of 1993 demolition operations completed as of this writing will make contemporary reference to the buildings in the past tense.

This report could not have been prepared without the help and support of many people. Thanks are extended to all who participated, including persons from the County of Monterey; Spreckels Sugar Company; various libraries, museums, and historical societies and interested individuals.

Individuals

Jack A. Abeloe
Margot Abeloe
Merton Elliot
Horace Fabing
Hans Jongens
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Tom Ryan
Jennie Verardo

Organizations and Sources

Bancroft Library
University of California, Berkeley
Berkeley, CA

California Historical Society
San Francisco, CA

Mechanics Institute
San Francisco, CA

Maritime Museum of Monterey
Monterey, CA

Monterey County Historical Resources Review Board
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National Maritime Museum
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Local History Collection
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Wells Fargo Bank
History Department
San Francisco, CA

The report would not have been possible without the assistance of Thomas Ryan who deserves a particular note of thanks. In addition to his duties as Farm Properties Manager, Tom spent many years committed to the management and assembly of historic documents, photographs and drawings for the Spreckels Sugar Company.

I. SITE HISTORY

Spreckels Sugar Company Factory No. 1 in the Town of Spreckels, California is an industrial complex built around a five-story beet sugar processing and packaging plant begun in 1897. The complex dominates the flat green agricultural landscape of the Salinas Valley (photos 1, 2). The Factory No. 1 site is symbolic of an industrial era often referred to as the Age of Enterprise, also described by Frank Lloyd Wright as the machine age:

> In this, the age of steel and steam, the tools with which civilization's true record will be written are scientific thoughts made operative in iron and bronze and steel...which characterize this age, all of which we call machines...They have made our era the machine age—wherein locomotive engines, engines of industry—or steamships take the place works of art took in previous history.[1]

When built the Factory No. 1 complex, located eighty-five miles southeast of San Francisco near the city of Salinas, was the largest beet-sugar factory in the world (fig. 1). In addition to developing the factory site, the Spreckels Sugar Company built the adjacent Town of Spreckels and eventually controlled large tracts of land in the Salinas Valley and neighboring areas for growing beets. The company built irrigation systems to serve its own property and that of other growers, and tied the beet growing areas to the factory, and the factory to distant markets, with a private railroad system (figs. 2, 3). Taken together the complex and related developments became an important regional example of America's Age of Enterprise.

FACTORY NO. 1 SITE AND DESIGN

Claus Spreckels, an enterprising German immigrant who rose to dominate the sugar industry in the Western United States, came to California in the 1850s from New York (photo 3). Among his many ventures, Spreckels established a cane sugar refinery in San Francisco in 1863. Over the next two decades he expanded his cane sugar enterprise to Hawaii and in California began experimenting with beet sugar. He already had a successful beet sugar extraction plant operating in Watsonville, California when he began purchasing property for a new factory in the nearby Salinas Valley in 1895.

At the time Spreckels was on the forefront of what would soon be a growing beet sugar extraction industry in the United States. Until the 1890s most sugar consumed in the United States was imported from Cuba, the British West Indies, Brazil, the Philippines and Hawaii, but several factors combined to encourage domestic sugar production by the end of the decade. Of primary importance was the resumption and increase of the tariff on imported sugar, but political unrest in the Hawaiian Islands and the interruption of the sugar trade caused by the Spanish-American War contributed to the development of the domestic industry.

The Watsonville factory, started in 1888, also proved the viability of the industry to entrepreneurs and farmers alike. Spreckels contracted with growers throughout the surrounding Pajaro Valley to ensure a steady supply of beets. The yield per acre and the

Fig. 1. Location map within California.

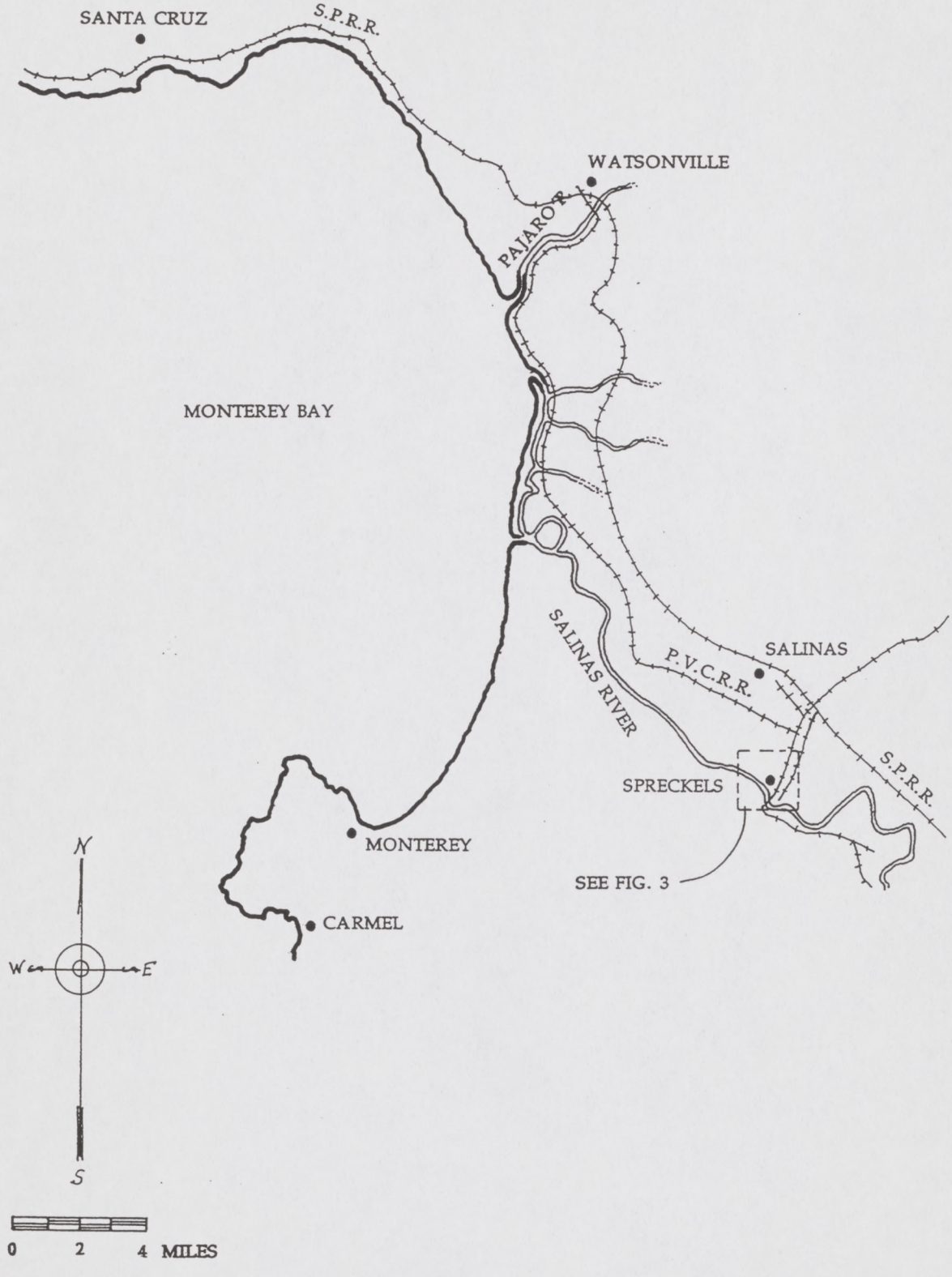
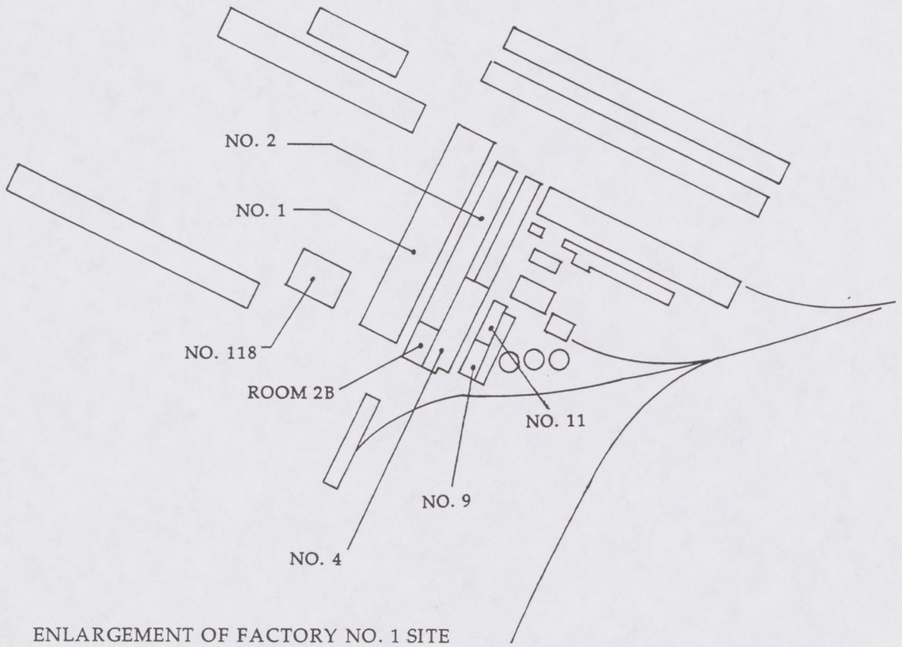


Fig. 2. Location map within Monterey Bay area.



ENLARGEMENT OF FACTORY NO. 1 SITE

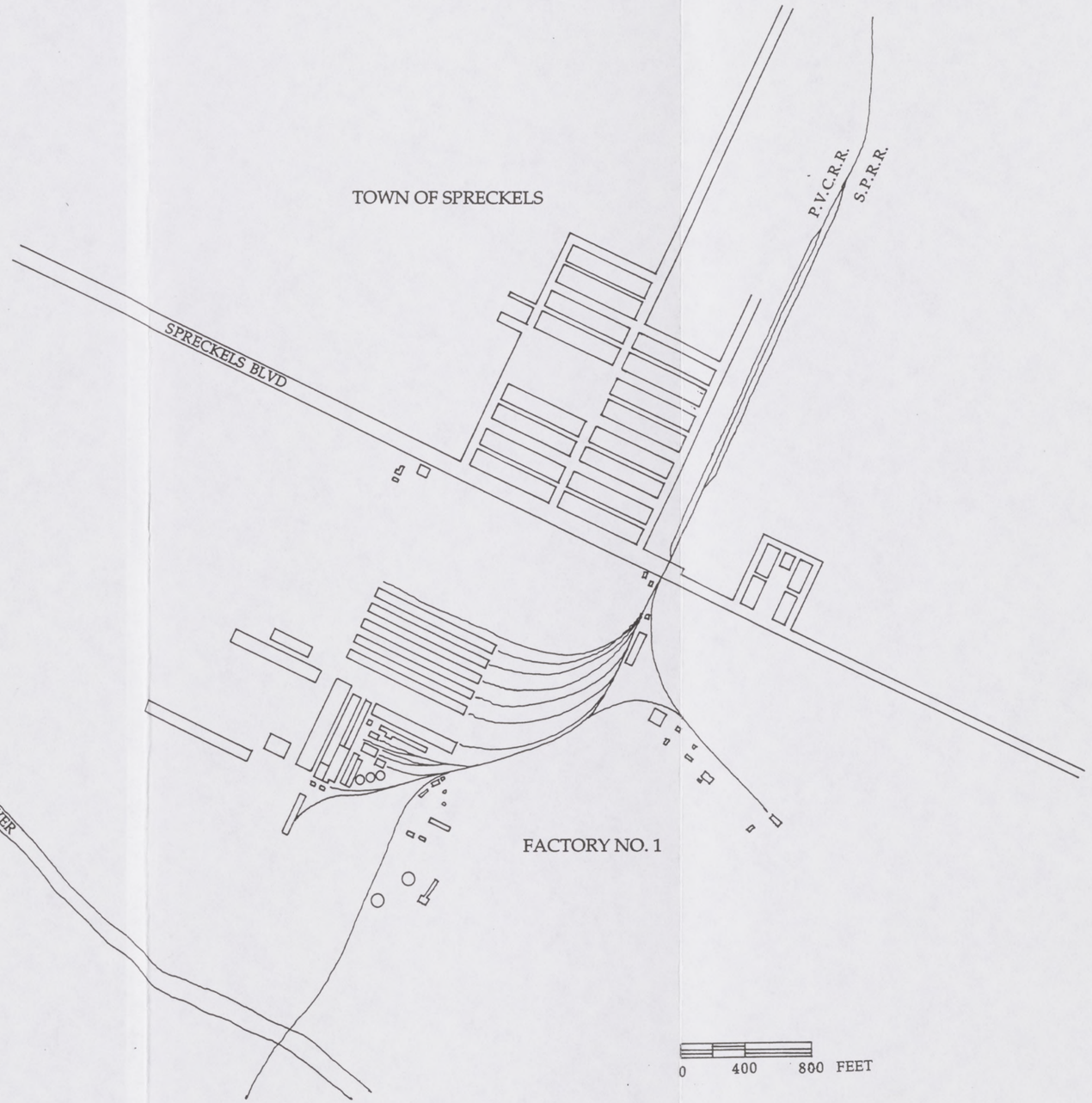


Fig. 3. Factory No. 1 site and the Town of Spreckels with key plan for buildings to be demolished.

sugar content of harvested beets proved to be among the highest in the world. Over the next few years Spreckels expanded the capacity of the Watsonville factory and, to increase the beet supply, contracted with growers further south in the Salinas Valley.

With this additional acreage under beet cultivation, Spreckels soon required still more processing capability and began looking for another factory site. The site needed to be in a location more central to the expanding beet growing areas of the Salinas Valley and have access to a steady water supply. The site chosen for the new factory, four miles south of Salinas City on the Salinas River, appeared to satisfy these two criteria.

Factory No. 1 Site and Ranch No. 1

The Map of Proposed Site of Beet Sugar Factory surveyed in October 1896 indicates the land which was under consideration for the factory site (drawing 1). Most of the property shown did become part of the final factory site which was assembled from portions of five parcels purchased by Claus Spreckels between 1895 and 1897, beginning with 608 acres acquired from H. Hatton in May 1895. In 1896 Spreckels added 1,467 acres of the Cowell ranch from W. D. K. Gibson and two parcels from F. H. Lang along the river totaling about 33 acres. The following year Spreckels purchased 112 acres of land on the south side of the Salinas River from Hiram Corey. This hillside parcel was purchased as a reservoir site. These five parcels of land represented the core of the Spreckels Sugar Company Ranch No. 1, which by 1897 included some 6,900 acres of company-owned land. Of the total approximately 305 acres were devoted to the factory site itself.[2]

In addition to land for the factory, Spreckels purchased rights of way or obtained easements that allowed both the standard gauge Southern Pacific Railroad and his own narrow gauge Pajaro Valley Consolidated Railroad (PVCRR) to service the Factory No. 1 site. The junction between the PVCRR and Southern Pacific lines was eventually called Spreckels Junction. Another line was also built northeast to Alisal to access a limestone quarry.

Site Design and Engineering

It is difficult to be definitive on who was responsible for the layout for the Factory No. 1 complex. None of the site plans for the complex are signed, and it is likely that most, if not all, of the site layout work was done in-house by engineers working for Claus Spreckels or his Watsonville company. Overall planning and design work for Factory No. 1 took place under W.C. Waters, superintendent of the Watsonville factory and General Manager of Factory No. 1 between 1899-1905.

The civil engineer most closely associated with the complex was Charles Pioda. Pioda had worked for the Pajaro Valley Consolidated Railroad before being hired by the Spreckels Sugar Company to work on the survey for the Factory No. 1 site. He continued doing engineering for the factory site until 1899 when he was placed in charge of engineering on the Spreckels ranches.

Original Factory Buildings and Layout

A description of an original Factory Yard Plan dated Jan. 29, 1897 details the layout of the principal buildings and features of the site, many of which form the core of the factory complex today (drawings 2, 3). As can be seen on the yard plan, the original site design generally related everything to the Main Building (No. 1) where the raw beets entered at the south end and sugar was loaded from the north. Adjacent to the Main Building is the Boiler House (No. 2), where boilers produced steam for engines, pumps and equipment in the Main Building. The Boiler House also included kilns and mixing rooms for preparing lime used in the extraction process.

Next to the Boiler House is the Shops and Storeroom Building (No. 3) which included the carpenter and pipe shops, the blacksmith and machine shops, and storage. Although in this early plan the Carpenter Shop stops short of the end of the Boiler House, when built the Shops and Storeroom Building aligned with the end of the adjacent building. Further east is the Sugar Warehouse (No. 5). The sugar warehouse completed the core of the Factory No. 1 complex (photo 4).

To the north of these buildings are the bins and dumps for receiving the beets. Five bins or sheds, which each housed two chutes and flumes, are shown served by railroad lines along with ten beet dumps to receive beets from wagons. At the north entrance to the Factory No. 1 site along Spreckels Boulevard is the building housing the Main Office and Scales (photo 5).

Three rail lines enter the site from the northeast with one line passing over a scale. Most rail lines on the factory site had three rails to accommodate both Pajaro Valley Consolidated Railroad narrow gauge and Southern Pacific broad gauge trains. The PVCRR was built by Spreckels to connect his factories to the beet ranches and to ship the extracted raw sugar; a history of the railroad is included in a later section. Spur tracks branch off to the beet sheds and to loading docks in the north end of the Main Building. Another branch swings around to the south end of the Main Building with two additional spurs that service the Boiler House: one running inside the building and one running between the Boiler House and the Main Building. These latter two tracks were used to bring in limestone and coke, and adjacent to the track south of the boiler House was an overhead trestle used to deliver coke and limestone, also called lime rock, to the top of the kilns (photos 6, 7). Another railroad spur runs between the Boiler House and the Shops and Storeroom Building.

Water lines which connect to a pumping station in the middle of the river are also shown on the site plan. A bridge over the river carried pipes toward a reservoir located on the hillside to the south and to the factory site north of the river. Pipes are shown to three reservoirs or settling ponds next to the Main Building, and to the beet sheds and bins where water running in flumes carried the beets to the Main Building for processing. Artesian wells connect into the pipeline between the river and the factory buildings.

Building Design and Construction

The *Salinas Index* reported on May 6, 1897 that construction work was about to commence on the factory.[3] Construction and installation of the equipment took place over the next two years until the first beets were sliced during the fall processing run or "campaign" in 1899.

No general contractor is associated with all phases of the construction so it appears that individual contractors and crews were supervised directly by the Spreckels Sugar Company during the construction. Excavation was done by contractor J.B. McMahon of San Francisco, who was also responsible for the masonry crews. The brickwork was supervised for McMahon by Joe Kavanaugh. The Shops and Storeroom Building was completed first, followed by the Boiler Shop. The brick walls of the Main Building were completed only after the equipment had been moved in through the steel frame (photos 8, 9).

The steel frame for the Main Building was provided and erected by Risdon Iron Works of San Francisco, which had already done extensive work for Claus Spreckels in Hawaii. Supervisor for Risdon was G. R. Field (photos 10, 11).

As with the site layout, it is difficult to assign responsibility for the design of the buildings to one specific person although again, engineer W. C. Waters appears to have played the leading role. The architect most closely associated with the site is William H. Weeks, who was clearly responsible for the Main Office and Scales building and a nearby residence for Waters, but there is no direct evidence he contributed to the design of the factory itself. Since these were industrial buildings, it is possible that most of the general design work was done by draftsman in-house, with detailing executed by the steel erectors and the masonry contractor from standard commercial construction of the period.

LATER BUILDING

1899-1905

Successive yard plans show the changes to the Factory No. 1 site after the original construction. The factory changed as new equipment was developed and installed, and as production capacity was increased. Although into the 1920s improvements seem to have been done at a steady pace, for the purposes of this report the changes will be grouped into years based on site plans used for reference.

The most significant changes occurred in 1905 when the Steffen process for extracting sugar from molasses was installed at Factory No. 1 (drawing 4). The new process was contained in the three-story Extraction Plant (portion of No. 4) built between the Boiler House and the Shops and Storeroom Building. The Carpenter Shop at the south end of the latter structure was also remodeled into the Filter Press Room to support the Steffen process. The Coppersmith Shop shown off the north end of the Extraction Plant on the 1905 site plan was actually not built until 1906-07.

The Pipe Shop shown within the Shops and Storeroom Building on the original factory yard plan was noted as the Boiler Shop by 1905. The Pipe Shop (No. 11) and Carpenter Shop (No.

9) were built as separate buildings to the east, in 1898 and 1905 respectively, to house functions displaced from the Shops and Storeroom Building.[4]

The Boiler House was also changed by 1905. The lime mixing rooms were devoted to the engines powering the adjacent Extraction Plant and the railway line running inside the Boiler House was removed. Other changes to the rail system serving the site included the addition of a Roundhouse east of the principal buildings and a spur to serve the new Carpenter and Pipe shops. An elevated or "high line" beet dump built on a trestle was also added between the two northernmost beet sheds in 1901.

The Sugar Warehouse (No. 5) was also expanded in 1901. A Beet Seeder Shed and a Train Shed shown north of the Main Building and Sugar Warehouse are not indicated on the next available plan from 1908, so they were evidently not built or had been demolished by that time.

1906-8

A 1908 site plan and period photographs show that the principal buildings remained much the same, but support structures were added in locations related to the Main Building (drawings 5, 6; photos 12, 13, 14). Near the south or "beet" end of the Main Building, the end where beets entered and the pulp by-product of the extraction process was produced, is a pulp silo where the wet pulp was stored and allowed to dry for use as cattle feed. Beyond the silo is a settling pond for water and pulp waste.

In 1906 a new warehouse, Sugar Warehouse (No. 57), with an adjacent rail line were built to the northwest, nearest the north or "sugar" end of the Main Building (photo 15). That same year two new kilns were added in a building adjacent to the Carpenter and Pipe shops on the eastern side of the site. These "rotary" kilns were used for reclaiming lime from the waste ponds and supplemented the "vertical shaft" kilns in the Boiler House. A Seeder Shed used to store field seeding equipment is shown adjacent to the original sugar warehouse.[5] Although not indicated specifically on the 1908 plan, a second "high line" beet dump was built in 1907. Instead of being freestanding, however, the trestle and dump were built within the northernmost shed as the roof was raised (photos 16, 17).

The complex suffered extensive damage, especially to the brickwork, during the 1906 earthquake. Damage to specific buildings is noted under the architectural descriptions in the following section.

1908-21

A site plan drawn in 1921, referenced through a version of the same plan updated to 1947, shows modest changes to the principal buildings and the construction of processing and storage buildings for the pulp by-product (drawings 7, 8). The Steffen Filter Press Room was rebuilt in 1920 as an addition to the Extraction Plant. The original Extraction Plant and the addition were collectively referred to as the Oliver Plant on some drawings, but a more general name used in this report will be "Steffen and Extraction Building (No. 4)." By 1920 the adjacent Boiler House was extended to the south for the installation of a third lime kiln (photo 18).

A pulp silo, actually a lined pit, was built west of the Main Building in 1909 (photo 19). A rail line was extended parallel to the silo from the south end of the Main Building. The adjacent Pulp Dryer Building (No. 118) was built in 1916 to dry the pulp more quickly. That same year a storage building for the dried pulp, the Pulp Warehouse (No. 117), was built further west; this was extended with a 200 foot addition in 1920.[6] To the northwest a Beet Seed Warehouse (No. 119) was added adjacent to the Sugar Warehouse (No. 57) in 1916.[7] The Boiler Shop within the Shops and Storeroom Building (No. 3) moved to a new structure adjacent to the Roundhouse in 1917 as the Machine Shop expanded.[8]

By 1921 only beet bins served by the railroad are shown, although wagons could unload into the sides of the bins. The trestle structure is still in place between the two northernmost sheds and is labeled "narrow gauge high line;" records and drawings indicate it was torn down and rebuilt in 1920.[9] The northernmost shed is labeled "broad gauge high line" and the trestle is indicated entering the building.

1920s-50s

While early site plans show the steady growth of the factory complex in its first twenty-five years, change after the early 1920s was much less dramatic. Revisions to the 1921 yard plan and an insurance map from 1949 show few changes through the Depression and World War II. A warehouse for soda ash was built just south of the Boiler Shop by 1925, and several additions appear off the end of the nearby Seeder Shed. In the absence of major building projects a smaller pattern is evident from the yard plans. As equipment and processes from the Main Building were upgraded they were often placed just outside the exterior walls, either as freestanding elements or within enclosed equipment rooms. Space and ease of installation were probably both factors in the location choices.

The rail line between the Main Building and the Boiler House was removed and beginning in the late 1940s the space was gradually taken over by other uses, including the Generator Room and a building for the Concentrated Steffen Filtrate (CSF) process. To the west a series of diffusion batteries and carbonation tanks were placed adjacent to the exterior wall. In 1952 the first bulk sugar bins were built off the north end of the Main Building and in 1957 the enclosed Bulk Pulp Warehouse was built on the site of the Pulp Silo No. 3.[10] A new office building for the finance and agriculture staffs was built along Spreckels Boulevard in 1958 (photos 20, 21).

1960s-70s

During the latter years of the factory, equipment continued to be modernized and some demolition began on older structures which were no longer needed. An equipment platform was built off the south end of the Main Building in the late 1960s, replacing functions once contained in the Extraction and Steffen Building. The majority of this latter building was demolished in 1972, leaving only part of the Extraction Plant portion as an annex to the Boiler House. The Packaging Facility (1967) and additional sugar silos (1972) were built to concentrate packaging operations for the Spreckels Sugar Company factories at Factory No. 1 (photos 22, 23).

END OF PROCESSING AT FACTORY NO. 1

By the early 1980s beet processing at Factory No. 1 became impractical due to transportation and energy costs. With the change by growers to more profitable vegetable crops in the Salinas Valley the beet acreage had disappeared. Beets for processing at the factory had to be brought in over longer distances by rail. The Factory No. 1 complex was also the oldest factory operated by the Spreckels Sugar Company and was not very energy efficient. Upgrading the equipment to reduce energy use was considered too expensive so the company closed the processing facilities at Factory No. 1 in June 1982 (photo 24, 25). The production history of the plant in terms of tons of beets sliced is given in the following table (fig. 4).

The packaging plant, built in 1967 to package sugar from all of the Spreckels Sugar Company factories, continues in operation supplied mainly with sugar hauled by truck from the company's Mendota factory. Demolition of the buildings which are the focus of this report began at the end of 1992 and continued through the summer of 1993 (photos 26-30).

PRODUCTS AND PACKAGING

During the eighty-four year operation of Factory No. 1 many different sugar products and packages were produced at the site. When Factory No. 1 opened in 1899 it produced only raw sugar which was shipped in barrels to the Western Refinery in San Francisco for final processing. After 1905, at the insistence of the American Sugar Refining Company which had a half interest in the Spreckels Sugar Company, final refining was also done at Factory No. 1 and finished sugar was shipped directly from the site.

From 1905 until after World War II the company produced only white, granulated sugar. The sugar was initially sold to stores in bulk barrels and then lined burlap bags. During World War I Spreckels began packing sugar in bags weighing two, five, ten, twenty-five or fifty pounds for home and industrial use. Industrial users became a growing sector of the market in the 1920s and 30s, requiring sugar for canning, dry food mixes and bottled beverages. The fruit canning industry was especially important in northern California.

After World War II the company expanded the types of sugar it offered to include powdered sugar, brown sugar, superfine sugar, sugar cubes, sugar tablets and sugar packets. Powdered sugar production at Factory No. 1 began in 1947 and eventually the product was offered in one and twenty-five pound bags. Spreckels "Golden Brown" sugar was introduced in 1951 and the company was the first beet processor on the Pacific coast to offer brown sugar. The product was dropped after a few years, but production began again in 1976 using new equipment installed in the packaging building. Some box packaging was also introduced in the 1950s.

Another product offered by Spreckels beginning in the late 1940s was liquid sugar for industrial users. Liquid sugar is used in the fruit canning industry as well as by bakers, confectioners and bottlers. The first liquid sugar tanks at Factory No. 1 were installed in 1948 and continued in use until the mid-1970s by which time, due to distance, customers were more easily served from other plants. Other industrial users still required dry sugar

YEAR	TONS	CWT
1897	110786	297770
1898	57761	143315
1899	172853	384374
1900	81214	235736
1901	271322	515599
1902	197948	429763
1903	147453	343893
1904	149073	301108
1905	167477	527652
1906	197927	608594
1907	109986	315526
1908	160013	511350
1909	197349	607721
1910	202726	682916
1911	198050	675008
1912	161253	550298
1913	141579	512878
1914	201733	715966
1915	337705	1181203
1916	372413	1261719
1917	347525	1167521
1918	209490	606231
1919	215110	812329
1920	255998	885870
1921	222333	800654
1922	111701	386500
1923	191751	675459
1924	263206	960600
1925	164441	610933
1926	173379	639838
1927	161124	571084
1928	216327	718550
1929	193823	657136
1930	335285	1141144
1931	339291	1141508
1932	478387	1651796
1933	600079	2084415
1934	587979	2037346
1935	455774	1574159
1936	646694	2246239
1937	473795	1673730
1938	517949	1736805
1939	628365	2184900
1940	696308	2322747
1941	472110	1549345
1942	492095	1598096
1943	259580	855491
1944	355172	1121785
1945	440512	1367380
1946	496159	1513762
1947	626729	1814529
1948	530164	1432237
1949	523509	1568901

YEAR	TONS	CWT
1950	667214	1877427
1951	510682	1359149
1952	428088	1204771
1953	573062	1574303
1954F	627570	1722927
1955S	186134	522970
1955F	593462	1575663
1956F	654479	1689656
1957F	844983	2169504
1958S	169784	360854
1958F	712183	1700132
1959F	1022464	2778778
1960S	126134	324749
1960F	621469	1693261
1961S	117946	294620
1961F	736339	1912898
1962S	138898	320282
1962F	924816	2387251
1963S	226794	549129
1963F	985452	2542149
1964S	412442	1101601
1964F	941148	2468264
1965S	546946	1439914
1965F	706024	1640036
1966S	404444	1080368
1966F	394389	1024437
1967S	335258	824470
1967F	541227	1250403
1968S	159425	379841
1968F	536443	1375255
1969S	367032	962121
1969F	546740	1366329
1970S	234953	716325
1970F	909589	2324312

Beginning in 1972, all statistics were computed for the entire year (not individual campaigns).

1971S	345009	1046248
1971F	727040	1781376
1972	1207237	3243937
1973	1240269	2980281
1974	848007	2330655
1975	1274034	3576840
1976	1300337	3567850
1977	967918	2632282
1978	479396	1273660
1979	955144	2521444
1980	1113000	2945985
1981	1143514	3112144

Fig. 4. Factory No. 1 production, tons of beets sliced 1899-1981. Spreckels Sugar Company.

and beginning in 1952 this was supplied from Factory No. 1 in bulk by trucks without packaging.

For individual users the company began producing paper sugar packets at Factory No. 1 in 1965 and expanded production in 1970. The plant at Factory No. 1 has also printed its own packets since the early 1970s. Beyond sugar packed under the Spreckels brand name, the facility at Factory No. 1 also packages sugar under other private labels, mainly for supermarket chains.[11]

FACTORY EMPLOYEES

Factory No. 1 was a major employer in the Salinas area, but the demand for workers varied greatly between the "campaign" and "inter-campaign" periods. The Salinas Index reported that the operating work force when the factory opened was over 600 men, although this figure may have included some harvest labor and only a small percentage were skilled workers at each of the processing stages.[12] Far fewer workers were required year-round for equipment maintenance. During the campaign the factory operated on two, twelve-hour shifts. Employee lists from the early 1920s indicate the work force could be broken down into eight groups based on wage rates. These groups of workers would have been similar to those when the factory opened, with the exception of some of the stationmen and 2nd class stationmen who worked in the rotary kiln and Steffen and Extraction buildings which were built later. From lowest to highest the groups were:

Common labor	Yard labor, rock and coke pile
Watchman, warehouse laborers	
2nd Class Stationmen	2nd & 3rd saturations, rock pile foreman, hot saccharate tank, brown sugar cutters
Stationmen	Cutter foreman, (diffusion) battery foreman, 1st carbonator, rotary kiln foreman, evaporator man, centrifugal foreman, sugar room foreman
Lime kiln foreman	
Sugar Boilers, some mechanics	
Mechanics	
Shop Mechanics	

Until the first World War I the work force was almost entirely male, with women working mainly in the sewing room making sacks and filter cloths and in the laboratory. The factory workers, as opposed to many of the ranch laborers, where also mainly native whites. Women took some positions in the factory during World War I and even more during the second World War when half of the applications for campaign employment were from women.[13] As in other industries, however, the women were expected to return to more traditional occupations when the men came home. Soldiers from nearby Ft. Ord also worked at Factory No. 1 intermittently during World War II.

Labor was organized in 1937 under a company union affiliated with the American Federation of Labor. The organization made hiring more equitable and shortened the work week to six, ten-hour days. Eventually unionization also meant equality in the hiring of women.

[1]Frank Lloyd Wright, "The Art and Craft of the Machine," in *Source Documents in American Architecture and Planning*, ed. Leland M. Roth (New York: Harper & Row, 1983), 365.

[2]Monterey County Deeds (Vol./Page): 45/476, 48/163, 49/438, 51/208, 50/228. Deed information provided by Spreckels Sugar Company.

[3]"Beet Sugar, Our Big Factory,"*Salinas Index* (Weekly), May 6, 1897.

[4]Construction dates for buildings and site improvements are taken from several sources. The most definitive are dated drawings for specific buildings and appraisal records. The appraisal records give year by year listings of improvements to the main plant property through 1913, recorded at the end of the fiscal year March 1 (see bibliography). Some information is also updated through 1924. Unless there is conflicting information these dates are taken as factual. Other dates come from the Spreckels Sugar Company Asset Inventory Book for Factory No. 1 and the Town of Spreckels and from notes on later insurance plans. Most entries in the Asset Inventory Book begin in 1913 or 1921 and were updated sporadically. Dates taken from the Asset Inventory Book or from insurance maps will be given and footnoted when more definitive dates are unavailable.

[5]The Spreckels Sugar Company Asset Inventory Book: Factory No. 1 and the Town of Spreckels indicates a 1904 construction date which is confirmed by the appraisal records. This building does not appear on the 1905 site plan.

[6]Spreckels Sugar Company Asset Inventory Book: Factory No. 1 and Town of Spreckels.

[7]Amstar Corporation, Spreckels Sugar Company, Spreckels, Calif., Factory Insurance Association Plan, 1972.

[8]Spreckels Sugar Company Asset Inventory Book: Factory No. 1 and Town of Spreckels.

[9]Ibid.

[10]Amstar Corporation, Spreckels Sugar Company, Spreckels, Calif., Factory Insurance Association Plan, 1972.

[11]Spreckels Sugar Company, Inc., *Sweet Nostalgia* (Pleasanton, California: Spreckels sugar Company, Inc., c. 1982) 98-106.

[12]*Salinas Index* (Weekly), May 6, 1897.

[13]*Honey Dew News*, Aug. 1942.

II. ARCHITECTURE AND DESIGN

The architecture and design section begins with a series of architectural descriptions of buildings at Factory No. 1. These typically cover the buildings as they were originally built based on observation, existing drawings and detailed appraisal records. Subsequent specific alterations are noted along with characterizations of general patterns of change as appropriate. Following the review of buildings is a biographical section on designers associated with the Factory No. 1 complex. Ending the architecture section is a discussion of the factory's design and construction relative to practices and styles of the nineteenth and early twentieth centuries.

The Factory No. 1 site is generally built to relate to the Main Building (No. 1) and the processing functions it contained. The Main Building and several adjacent structures combined to form the nucleus of the Factory No. 1 complex. The architectural descriptions, therefore, will begin with these principal buildings and then proceed to other selected buildings within the complex relative to their function and use. While the principal buildings housed the sugar extraction process, other structures on the site were devoted to receiving the required raw materials, storing the packaged sugar, processing by-products or otherwise supporting the functions of the factory. Buildings and structures beyond those proposed for demolition were selected based on their importance and available research materials.

The architectural descriptions contain some more technical notations and terms which conform to HABS/HAER standards. Approximate dimensions are given in feet, and the word "feet" is noted by the apostrophe symbol ('). Dimensions in inches are noted with the quotation mark symbol ("). More precise dimensions are given in feet (') and inches ("), separated with a dash. Overall dimensions which describe the footprint of a building are separated with an "x" which stands for "by." In describing windows, panes of glass are called "lights."

ARCHITECTURAL DESCRIPTIONS
PRINCIPAL BUILDINGS

Main Building (No. 1)

Date of Construction:	1897-99
Use:	Beet processing into sugar (1899-1982), packaging (1899-1967)
Additions:	Generator Room (No. 1A, c. 1950)
	CSF Building (No. 1B, 1947)
	New Steffen Addition (c. late 1960s)
Photos:	31-35
Drawings:	9-13

Description
The Main Building (No. 1) is a five-story, steel-frame structure with a non-load-bearing brick perimeter wall. The building footprint is a simple rectangle that measures approximately 105' x 584'. The building measures 90' high at the eaves and 120' high at the ridge, with a gable roof running in the north-south direction. Brick pilasters occur at each perimeter steel column, which are spaced at between 13'-6" and 18'-6" apart. The pilasters divide the facades into generally regular bays; forty-two bays on the east, thirty-nine on the west, and seven bays on the north and south.

Windows are centered in almost each bay on all floors; some bays on the ground floor have doors in place of windows. At the northern end of the east and west facades are two openings for train tracks which ran through the building. The regular window pattern of the south facade includes in-filled or "blind" window openings at the solid walls of the Wash House behind.

The exterior pilasters continue to the top of the wall and end in a continuous corbel table which forms the eave of the building on the sides and a belt across the ends. A corbelled base approximately 2' high goes around the perimeter of the building. Gable vents at each end trimmed with brick in a cross pattern are another decorative feature of the design. Similar Italianate or Romanesque Revival details were used on buildings of varying functions at the Factory No. 1 site.

Function and Use
The raw beets entered the southerly portion of the building via four, 2' wide flumes that penetrated the west wall, were washed, cut and gradually processed into sugar. Packaging originally occurred at the north end of the building, where the sugar was loaded from docks onto rail cars.

The building is referred to as having two major portions, the "beet" end (column lines 1-28) and the "sugar" end (column lines 28-43), but breaks down into three main zones based on how it is subdivided on the interior. The "sugar" or north end, where finished sugar left the building, makes up one zone and is generally divided into six floors, with the top level being a floor which starts just below the eaves and extends up into the truss space. The

"beet" or south end, where raw beets entered the factory, contains two zones. One zone at the very south end is divided into five partial floors and contains the enclosed Wash House, although it appears that originally this area was divided into only three floors. The other zone is a generally open area at the center of the building which contained most of the intermediate processing equipment (photo 33).

Components and Systems

Structural System

The building has steel columns and girders with triangular long-span steel roof trusses. The columns are built up from rolled structural shapes and rest on concrete foundations. All steel connections are riveted except for welded construction around the centrifugals in the sugar end installed in 1957. The brick infill rather than diagonal bracing was intended to provide the required shear strength. A bridge-like truss across the open center of the building laterally supports what were otherwise unbraced side walls.

After the 1906 earthquake vertical steel truss reinforcements were added along columns at the south end of the east wall and at three locations in the west wall. Some diagonal bracing was also added near the center of the building at the ground floor and at the roof.

Footings

The walls of the first floor and the outer wythe of brick overall rest on unreinforced concrete spread footings between the column supports. Most of the load of the building is carried on the columns which have cast-iron bases set in cement grout on poured-in-place, unreinforced pyramidal concrete piers. There are no anchor bolts securing the column bases to the piers. The piers generally start 18" below the finished floor, but are at lower levels in some locations at the south end to accommodate the flumes entering the building and other equipment. Additional foundations occur under heavier pieces of equipment on the ground floor.

Walls

The 17" thick red brick perimeter walls are unreinforced. The outer wythe of brick bears its own load. The inner wythes of brick rest directly on the steel frame making the wall construction a composite system. The exterior steel columns are flush with the interior face of the wall and are exposed to the inside. Steel beams or girders span the wall between the columns at each floor level along portions of the exterior wall where interior floor construction has been omitted. This occurs typically at the center of the building. The walls were originally whitewashed on the interior.

Interior Partitions and Finishes

No information dating from 1898 is available on the interior partitions, but subsequent appraisal records from the 1920s describe the major partitions, most of which were probably still original. Most of the major interior partitions in the processing areas were common brick and measured 13" to 17" thick. Partitions were typically whitewashed on both sides, a common practice used to brighten the interiors of mills and factories. Minor partitions in offices, the lunch room and restrooms were generally wood frame.

Floors
The floors have a steel frame spanned by arched, unreinforced concrete that is 4" to 5" thick at the center of the arch. The ground floor is a 7" to 9" thick concrete slab on grade.

Roof
The roof, originally slate, is now covered by composition shingles over a 2" x 6" wood deck supported by purlins spanning between long-span steel trusses. A monitor vent, approximately 3' high and 13' wide, ran the length of the ridge with pivoting iron shutters to both sides.

Doors
Original drawings indicate pairs of three-panel wood doors with arched, two-light transoms, but a later inventory indicates that pairs of eight-panel doors were installed with twelve-light transoms above. The arched door openings are trimmed by brick hood molds. The east and west walls had five door openings each. The east wall also had two arched openings where trains entered the sugar end of the building for loading. Larger openings were also later created in the west wall. The south wall had one pair of doors. The pairs of doors were 6' or 8' wide and set within 2-1/2" x 8" wood frames. The exterior doors appear to have been stock and were 1-3/8" or 1-3/4" thick.

Interior doors were similar to those on the exterior but had just six panels and only some had transoms. Heights and thicknesses of the interior doors varied. With subsequent construction and renovations, most of the openings and doors on the interior and exterior were altered over time.

Windows
Almost each bay originally had a single window and most remain in place. They are double-hung wood sash windows, arched at the top, with brick hood molds. The ground floor windows are larger with sixteen over sixteen lights. The upper windows have twelve over twelve lights. The gable ends in the north and south walls have three additional windows that are five over five lights. Four dormers even with the exterior wall on the east side bring light into the building. Skylights were also originally in place at the "sugar" end on the east side, but were later closed, perhaps when the building was re-roofed in the 1940s. Some interior partitions also originally had windows similar to those on the exterior.

Stairs &Elevator
Numerous stairs connect different levels of the building and platforms adjacent to equipment. Originally all the stairs were cast iron, with checkered iron treads and gas pipe railings. An elevator was originally located along the east wall between column lines 30 and 31.

Bridges
Two bridges located at the second floor level originally carried steam pipes and foot traffic from the adjacent Boiler House (No. 2). Both bridges had a steel floor structure enclosing pipes. The sides of the bridges were open and the top was covered by a slate roof. The area between the Main Building and the Boiler House was eventually built over and the buildings were connected internally.

Tunnel and Sugar Warehouse Conveyor
Original plans for the Main Building (No. 1) and factory yard plans indicate that a tunnel was designed from the building's north or "sugar" end, under the Boiler House, to the Sugar Warehouse (No. 5). The tunnel is seen in section on the design drawings and measures 7' x 8' high. Although built, it was quickly superseded by an enclosed conveyor built across the roof of the Boiler House to the warehouse indicated on the 1905 yard plan (drawing 4).[14]

Additions and Alterations
1906 Earthquake
The April 1906 earthquake damaged many portions of the building. As the *Salinas Index* described the situation:

> The Spreckels Company fared worse than anyone in the county. All of the steel structure in the big factory is out of line and it is estimated that it will be necessary to practically rebuild the factory. The main building was ... thrown entirely out of line, the wall in the center bulging about eight feet from plumb. The front of the building caved in, except the steel framework. The concrete floors are twisted out of level and the machinery is turned into all sorts of fantastic shapes.[15]

Period photographs and written reports on the earthquake document the damage to the Main Building (photo 34).[16] The east and west walls, being laterally supported by only one bridging truss at the generally open middle zone of the building, buckled at the center of the facades. At the west wall brick had to be removed from the top three floors across four bays for the frame to be pulled back into line. The north wall also suffered heavy damage, especially at the third floor, and bricks were lost from the cornices of both the north and south ends. Large vertical cracks appeared throughout the building in the corners of the pilasters where they meet the wall.

The building, although it sustained heavy damage to its brickwork, actually survived the 1906 earthquake well considering its location and was readily repaired. Structural modifications following the earthquake are noted under the Structural System heading above.

Generator Room (No. 1A) and CSF Building (No. 1B)
The first extension into the alley between the Main Building and the Boiler House, the Boiler House Addition, was built in 1911. A four-story, flat-roofed connection was inserted between the buildings in 1947 to house the Concentrated Steffen Filtrate (CSF) evaporator. About 1950 another two-story building was extended from the Boiler House addition down the alley for the generator room . The Generator Room measured approximately 24' x 95' and the CSF Building was approximately 24' x 105'. Brick was removed from the east wall at the second level of the Main Building to accommodate the connections.

New Steffen Addition
In the late 1960s, the Steffen station machinery was installed on a steel and concrete floor deck constructed one story above grade on the south side of the Main Building (photo 35). The equipment was for the Continuous Saccharate Process and replaced operations formerly contained in the Steffen and Extraction Building.

Other Changes
Several times during the operation of the factory, equipment was removed or installed that required larger openings than those originally provided. At least four openings on the north end and three on the west end were enlarged for this purpose, and several other openings were created and later in-filled. In the 1970s a new interior steel frame was built for a crane used to move new equipment and some interior columns were strengthened or encased in concrete.

The Loma Prieta Earthquake and Post-earthquake Condition
After standing unused for seven years, the Main Building was in very poor condition by the time of the Loma Prieta earthquake in 1989. The building suffered extensive structural damage as a result of the earthquake. Over the years, the corrosive action of water and sugar had severely weakened the exposed structural steel frame. The large openings in the walls made for installation of machinery and inadequate lateral bracing had further compromised the integrity of the structure. Immediately after the earthquake, Monterey County building officials declared the building unsafe for occupancy.

Following the earthquake, engineering studies were done to determine the condition of the building. Along with earthquake damage to the trusses and diagonal bracing at the roof, the roof itself was found to be in poor condition. The studies also found water damage to the walls and mortar, and determined that the numerous shear cracks from both of the large earthquakes had weakened the capacity of the walls to further resist lateral stress.

Demolition
All hazardous chemicals and most of the asbestos had been removed from the Main Building before the Loma Prieta earthquake in 1989. Demolition of the interior began in 1990 and continued through 1992. The salvage work included the removal of the machinery and non-structural steel. Some of the interior structural steel columns and beams were also removed and the connecting buildings toward the Boiler House were demolished above the second-floor level. In March 1993 the middle third of the building was demolished, and by mid-May the south third had followed. Demolition was completed in August 1993.

Boiler House (No. 2)

Date of Construction:	1897-98
Use:	Boiler House & Lime Kilns (1899-1982) Mixing Room (1899-1905), Steffen Engine Room (1905-1960s)
Additions:	Boiler House Addition (1911), Lime Kiln Room Addition (1920-21)
Photos:	36, 40, 42
Drawings:	14, 15

Description

The Boiler House is a one story building with load-bearing brick exterior walls. The building is 571' x 68' and measures 65' high at the ridge of the gable roof. The exterior details are similar to the Main Building, with a corbel table and pilasters that divide the facades into approximately equal bays.

The north end and south end facades are four bays wide with gable vents set within decorative brick trim forming a cross. The westernmost bay at each end originally had a large arched opening to accommodate a railroad track which passed through the building. The remainder of the bays on the north side had double-hung, arched windows with sixteen over sixteen lights surmounted by a hood mold. Similar windows were found at two bays on the south facade, but between them was another large arched opening into the Lime Kiln Room. This opening was in-filled by 1905, leaving only a pair of man doors with a transom.

In original drawings the west facade toward the Main Building is divided into forty bays. Each bay had an archivolt molding toward the top near the corbel table. In the wall surface below were smaller arched openings (with hood molds when built) which were drawn without glazing. Five bays appear to have had full-height openings as doorways. The apparent openness of the original facade was probably due to the railroad tracks just inside the wall. The east facade more closely resembled the first floor of the Main Building, with double-hung windows and doors with transoms. Most of these east and west facades were subsequently obscured by adjacent buildings.

The brick masonry walls are 17-1/4" thick and rest on 2' thick concrete spread footings with brick foundation walls. At the top of the walls is an 8-1/4" seat for short steel studs which form the end of the roof trusses. The structural system is a composite in that certain bays, at the larger roof openings for the lime kilns and at the major interior partitions, have steel columns at the exterior walls to support the roof trusses. All connections, both at the trusses and columns, are riveted. The roof trusses and purlins support 2" x 6" wood roof decking. The original roofing material was slate. A vent monitor at the ridge begins just north of the lime kilns and runs nearly the length of the building.

Interior partitions which formed divisions between the different functional areas of the building appear to have been brick with the same thickness as the exterior wall. The floor is concrete slab on grade approximately 5" thick.

The building is distinguished by two 216' high steel chimney stacks, which are 13' in diameter at their base above the boilers. Since the 1989 earthquake, the chimney stacks show a distinct lean toward the west. The tops of the lime kilns also protrude prominently through the roof at the building's south end. A concrete tunnel measuring 7' x 6' high runs under the Boiler House. It was used to empty the ashes from the boiler stacks and transport them to the south end of the site.

Function and Use
The building and chimney stacks were completed prior to completion of the Main Building. Original drawings show the building divided functionally into three areas: a room housing the boilers, an area for processing lime (Room 2A) and the Lime Kiln Room (Room 2B). The northern two-thirds of the building was one large room housing a series of boilers that generated steam used by the pumps, engines and evaporators in the Main Building. A railway spur went through the west side of the building to service the boilers.

Room 2A
This is referred to by Spreckels Sugar Company as a building, but it is part of the same building mass as the Boiler House and cannot be distinguished from it on the exterior. The area started as two rooms in 1897, the Lime Mixing Room and the Lime Floor, both used in preparing lime from the adjacent kilns for use in the Main Building. The dividing wall was torn down by 1905 and the room functioned as the Steffen Engine Room, with steam engines to power the adjacent Extraction Plant (portion of No. 4).

Room 2B
Like Room 2A, this is a continuation of the Boiler House. The south end of the Boiler House contains kilns, large tapering masonry cylinders that burn limestone to form lime and carbon dioxide for use in the sugar extraction process. Two kilns were originally installed. Drawings indicate, however, a third lime kiln was planned within the original building and the roof framing allowed for an additional kiln stack. The third kiln was instead built to the south by 1921.

Additions and Alterations
Aside from the internal changes in the use of rooms mentioned above, the building was extended south approximately 21' to accommodate the third lime kiln. The south facade was rebuilt with four bays in a manner similar to the original drawings, although the openings changed location. Two bays still had windows and one had a large, arched opening. The fourth bay appears to have been blank, but a large opening was later created. The windows were subsequently in-filled with block. Two of the windows on the north facade were also in-filled with brick; the large opening was enlarged to open the entire bay.

The railroad was taken out in 1905 with the conversion of the lime preparation rooms into the Steffen Engine Room, and the openings along the west wall toward the Main Building were apparently glazed.

Boiler House Addition
Most additions between the Boiler House and the Main Building are covered in the previous section since they were extensions related to the Main Building. The first building in the

alleyway, however, was an addition to the Boiler House built in 1911. The addition, which housed two new boilers used mainly between campaigns, is only one story but reads as two from the exterior. It has a gable roof, steel framing and steel roof trusses. The exterior detailing closely matches that of the Boiler House.

Demolition
The Boiler House and Boiler House Addition were demolished by May 1993.

Shops and Storeroom Building (No. 3)

The present Shops and Storeroom Building is the northerly portion of a larger original building built in 1897-99 which also included a Carpenter Shop and Lime Storeroom at its south end. These latter two rooms were converted into the Steffen Filter Press Room in 1905 when the Steffen Process was introduced. The Filter Press Room was torn down in 1920, as the adjacent Extraction Plant (No. 4) was expanded.

Date of Construction:	Portion of larger building constructed 1897-99
Use:	Machine Shop, Blacksmith Shop & Storage (1898-1982) Storage (1982-present)
Photos:	37-39, 44
Drawings:	16, 17

Description
The Shops and Storeroom Building is a one-story structure with brick exterior bearing walls and a gable roof. The building is 290' x 40', and measures approximately 38' feet high at the ridge. The construction and detailing match the adjacent Boiler House, with exterior brick walls on concrete spread footings and brick foundation walls, slab-on-grade floor and steel roof trusses. The original roofing material was slate.

Pilasters divide the facades into approximately equal bays. A corbel table runs across the end facade and forms the eave of the building down the sides. The north end is three bays wide and the east and west facades have some twenty-one bays remaining from the original building. The north end has sixteen light over sixteen light, arched, double-hung windows with hood molds to either side of a larger door opening and arched transom in the center bay. The original door, which was probably a vertical sliding door, has been replaced by an infill wall and single man door. A gable vent above with brick trim is similar to those of the Boiler House and Main Building.

Most openings in the east and west walls are glazed with double-hung windows matching those on the end facade. Window details dated September 1897 show a less elaborate molding above the window than was actually constructed a few months later (drawing 29)

At the north end of the Shops and Storeroom Building is a small remaining portion of the Extraction and Steffen Building Addition described below.

Function and Use
The building was used for storage and various workshops. The storeroom occupied the northern end of the building and stayed constant in size. The rest of this remaining portion of the original building always contained the Machine Shop and Blacksmith Shop, although based on yard plans the space devoted to each appears to have changed over time.

Alterations
This portion of the original building changed very little over time with the exception of an enclosed conveyor system built across the roof from the Main Building to the Sugar Warehouse (No. 5).

Extraction and Steffen Building (No. 4)

To the east of the Boiler House stood a combination of two buildings begun in 1905 and integrated further with expansions in 1920. The western portion was built in 1905 as the Extraction Plant or Steffen House, and the larger eastern portion, built in 1920, can be considered an addition. In later drawings the buildings together are generally referred to as the Extraction and Steffen Building. The 1921 yard plan puts them together under the name "Oliver Plant" in reference to Oliver filter equipment which was installed when the eastern portion was built. The majority of the eastern addition was demolished in 1972, and only seven bays of the western portion are still standing. Both the original Extraction Plant portion and the addition will be referred to in the past tense for the purposes of this section since the description is for the entire combined building.

Date of Construction:	1905
Use:	Steffen Process
Additions:	Foundry (No. 60, 1906-07), Extraction and Steffen Building Addition (1920), South Addition (c. 1935)
Demolished:	Majority demolished 1972
Photos:	37, 40-42
Drawings:	18, 19

Description
The original Extraction Plant portion of building No. 4 was a three-story, combination steel-frame and brick-bearing-wall structure. Overall measurements were approximately 234' x 24', and the building was 55' high at the top of the gable end parapet. The building was inserted between the Boiler House and the one-story Filter Press Room in building No. 3, so consequently only the end walls and upper portions of the side walls were visible. The exterior detailing was similar to that of the adjacent buildings with corbelling at the base and parapet, brick hood molds at openings and circular gable end vents.

The north and south end walls were one bay wide; the corners were marked by brick pilasters with square parapet returns. Each end wall had a door and window on the ground floor, although these were obscured with subsequent additions. The south end originally had two double-hung windows on both the second and third floors. The north end had three windows on the third floor and two on the second floor grouped within a larger arched opening, but these lower windows were also quickly obscured by the addition of the Foundry. The side walls apparently had pairs of rectangular, double-hung windows at the second floor above the level of the adjacent roofs, and somewhat larger windows in a similar pattern at the third. Arched windows and hood molds were probably not used at these locations since the windows were generally out of view from the exterior. The first seven bays on both sides at the south end had large wall vents filling the space between the brick pilasters. To the east the vents opened into the addition after 1920.

Original drawings indicate the end walls were bearing walls, but the sides had steel framing clad in brick. The side walls were upward extensions of the side walls of both the Boiler House and the Filter Press Room, and certainly these common walls were reconstructed to a large extent when the Extraction Plant was built. All of the Extraction Plant walls were

brick supported by unreinforced concrete spread footings. The steel columns had cast iron column bases and rested on concrete piers. The end walls were 17" thick at the base; upper walls on all sides were 13" thick.

The roof system was steel trusses with 2"x 6" decking and slate roofing. A 2'-6" high monitor vent ran about 95' down the ridge beginning from the south end.

The ground floor was a 6" concrete slab on grade. The second and third floors were arched concrete similar to those in the Main Building, and were from 10" to 11" thick at the bottom of the arches. From original drawings the second floor appears to have been supported by an angle off the brick masonry wall. The third floor was supported directly on the wall by a 4" ledge or seat.

Function and Use

The Extraction Plant was built to house part of the Steffen Process which was installed in 1905. The Steffen Process recovered additional sugar from the molasses produced as a byproduct of the extraction processes in the Main Building. The south end of the Shops and Storeroom Building was remodelled in conjunction with the building of the Extraction Plant, and the space functioned as the Steffen Filter Press Room where impurities were filtered out of the sugar juice produced in the Steffen Process. The Steffen Filter Press Room was taken down when the Extraction and Steffen Building Addition was built in 1920 with updated equipment.

Additions and Alterations

Foundry (No. 60)

The first of three additions to the Extraction Plant was a foundry built off the north end of the building in 1906-07. It remains standing today. Being between two existing buildings and an extension of a third, only the north end wall and roof were really new. The building has 17" thick brick walls, a gable roof with steel roof trusses and a 5" slab on grade floor. It measures 117' x 24', and though tall, is only one-story on the interior.

Extraction and Steffen Building Addition

The addition was built on the site of the Steffen Filter Press Room in 1920. Some portions of the earlier building dated from 1897-98, and some were built in 1905. It is unclear how much of the Filter Room foundations, walls or floors were incorporated into the new building addition in 1920.

The addition measured 39' x 259' and repeated the construction of the Main Building and Extraction Plant, with steel framing clad in brick, concrete slab on grade and steel-framed concrete floors and steel roof trusses. The facades were divided into bays by pilasters and a corbel table runs along the eaves and across the ends. The gable roof was topped by a continuous monitor vent. Although only two stories, it matched the three-story Extraction Plant in height.

The building was two bays wide and extended nineteen bays along the east and west, two bays beyond the Extraction Plant. The south wall had pairs of arched, double-hung windows with hood molds in each bay, and most bays in the east wall had single windows or doors. Openings were retained from the Extraction Plant into the addition on the west.

While most of the addition was used to house equipment for the Steffen Process, the northernmost four bays, the portion still standing, was divided off into a separate room on each floor. Yard plans indicate the rooms were used as workshop space related to the adjacent Shops and Storeroom Building.

South Addition
A one-story brick addition off the front of the Extraction Plant was built in about 1935. The addition is about 24' x 21' and aligns with the front of the Boiler House.

Demolition
The remaining portion of the Extraction Plant, in later years considered an annex of the Boiler House, was demolished by May, 1993.

PRODUCT STORAGE

Sugar Warehouse (No. 5)

Date of construction:	1897-98
Use:	Sugar warehouse (1899-present)
Additions:	Extended in 1901
Photos:	43, 44
Drawings:	20, 21

Description
The warehouse is a one-story, steel-framed building with brick exterior walls. It is rectangular in plan and measures 80' x 560'. The building is approximately 26' high and has a gable roof. Exterior detailing matches that of the other buildings, with a corbel table and gable-end vents. The parapet forms rectangular returns at each corner. The facade is evenly divided by brick pilasters, five bays to the east and west, and thirty-one bays on the north and south. The pilasters are spaced approximately 18' apart; sliding loading doors or blind openings were originally centered in the bays.

Walls are common brick 13" thick, and bear on concrete spread footings with brick foundation walls. Steel columns occur at each pilaster and support the roof trusses. All connections are riveted. The columns have cast iron bases and rest on concrete foundations. The roof is framed with Warren trusses bridged by purlins supporting 2" x 6" wood decking. The original roofing was slate. The floor is 6" concrete slab on grade.

Function and Use
This was one of the first buildings constructed at the site and is still used to warehouse sugar. An elevated belt conveyor brought packaged sugar to the warehouse from the "sugar" end of the Main Building. From here the sugar was loaded into rail cars sitting on the spur adjacent to the north side of the building. At first the building stored raw sugar to be transported to San Francisco for refining, but after 1905 pure sugar was produced at Factory No. 1. Today the sugar, hauled by truck, is produced at other factories and only packaged at the Factory No. 1 site.

Additions
The original warehouse measured only 200' long, but was extended to its current length in 1901. A 4' high concrete loading dock for trucks was added toward the east end of the south side by the late 1950s. The loading dock has a corrugated iron roof canopy on steel trusses.

Sugar Warehouse (No. 57)

Date of Construction:	1906
Use:	Warehouse (1906-present)
Additions:	Enlarged 1934
Photos:	45-48

Description

This second sugar warehouse is a two-story, gable-roofed building of poured-in-place concrete and steel construction which measures approximately 80' x 578' in plan. The original building heights were 23' at the eave and 36' at the ridge of the gable roof. Today the building is approximately 48' high. Although the walls are unfinished concrete, the facades are still divided into bays by pilasters which terminated in a formed corbel table at the eaves or a band across the ends. Both end facades are divided into four bays; the side walls have thirty-two bays each. The north wall originally had sixteen, 4'-6" x 13' high sliding doors for loading the sugar into railroad cars on the adjacent spur track. The east facade had a 3' x 6'-6" door at the northernmost bay.

The walls are 10" thick and rest on 18" thick concrete foundation walls and 1' x 3' spread footings. Built-up steel columns which support the steel roof trusses are anchored to the side walls at the interior. The roof deck is supported on purlins and was originally wood. The original roofing material was slate. The floor is a 6" concrete slab on grade.

Function and Use

This building was built to store sacked sugar and effectively doubled the factory's on-site storage capacity. Beginning in 1905 white sugar was produced at Factory No. 1 and it is likely the company quickly needed more storage space.

Alterations

The building was expanded in 1934. The roof was jacked up and the walls were extended upward approximately 12'. The gable ends were removed and the tops of the walls were built to match the sides. The end of the roof itself was hipped.

BY-PRODUCT PROCESSING AND STORAGE

Pulp Dryer Building (No. 118)

Date of Construction:	1915-16
Use:	Drying beet pulp (1916-82)
Photos:	49-51
Drawings:	22

Description
The Pulp Dryer Building is a two-story, steel-frame building with brick exterior walls. Overall measurements are 115' x 151' in plan and approximately 34' in height. The lower floor varies from 16' to 19' under the partial second floor. The roof has a shallow pitch. A very low, gabled parapet follows the roof line on each end up to a straight section of parapet at the center.

The exterior detailing is similar to that of the other buildings but not an exact match. Brick pilasters divide the facade into bays: nine regular bays on the north and south, and seven irregular bays to the east and west. The pilasters terminate into a continuous corbel table. The corbelled dentils are smaller and more closely spaced than on the other buildings. The center two pilasters at each end continue up through the gable-end parapet and have pyramidal caps. The corner pilasters form rectangular ends to the parapet which also have pyramidal caps. There is generally one window or door opening per bay on each floor; one bay on either end has two openings. All windows are arched, double-hung, and have divided light glazing. Upper windows were originally eight lights over eight lights, and ground floor windows were twelve lights over twelve lights. Arched hood molds occur at all windows. There were originally seven door openings at the ground floor: three 12' x 13' high openings with squared hood molds on the south wall and four smaller openings around the perimeter.

The walls are 17" thick brick resting on an a 18" thick reinforced concrete slab and concrete foundation walls. Additional raised concrete equipment pads occur at the ground floor. The upper floor is a 5" reinforced concrete deck over the steel frame. The roof has an exposed steel frame with a 3" reinforced concrete deck. Along the ridge is a 3' high by 15' wide roof monitor with clerestory windows to both sides. Prior to the equipment being removed, chimney stacks protruded through the south side of the roof. Pipes and conveyors connected the building to the Main Building on the east and to the Pulp Silo No. 3 and Pulp Warehouse to the west.

Function and Use
This building was built to house equipment used to dry the wet beet pulp by-product coming from the "beet" end of the Main Building. When dry the pulp, used as cattle feed, was more easily stored and transported.

Alterations
Many of the openings were altered or in-filled over time, but otherwise the building was not significantly changed to the exterior.

Demolition
Demolition of the Pulp Dryer Building was completed by April 1993.

Pulp Silo No. 3 (No. 70)

Date of Construction:	1909
Use:	Storage of wet pulp
Demolition:	c. 1957, site used for Bulk Pulp Warehouse
Photo:	19
Drawings:	23, 24

Description
The pulp silo was a pit lined with 2" x 12" redwood planks. It measured approximately 536' x 125'. The pit was formed both by excavating and by building up embankments. The overall depth was 18' and the bottom was 8' below grade.

Function and Use
The open pulp silo was the first method of dealing with and storing the wet pulp from the factory. After draining and drying somewhat in the silo it could be loaded into wagons or rail cars and transported to feed lots. After the Pulp Dryer was installed the silo was a storage area for the pulp prior to drying.

Pulp Warehouse (No. 117)

Date of Construction:	1916, burned and rebuilt 1918
Use:	Warehouse for sacked and bulk pulp (1917-1982)
Additions:	Enlarged 1920
Photo:	52
Drawings:	25-27

Description
This warehouse is a one-story, gable-roofed building which originally measured 75' x 520' in plan. Roof heights are 43' at the ridge and 25' at the eave. The exterior finish is corrugated galvanized iron siding and the roof is similar iron sheeting. At the north facade there were originally eleven 8' x 14' high loading doors.

The side walls are framed with 8" x 16" wood columns with intermediate 4" x 6" columns, 2"x 8" girts and 2" x 8" diagonal braces. End walls are framed with 4" x 6" columns and similar girts and braces. The building has continuous concrete foundation walls and spread footings; the foundation wall thickens to form piers at column locations. The roof trusses are wood and the floor is a 6" concrete slab on grade.

Function and Use
The warehouse was built in conjunction with the Pulp Dryer Building. The dry pulp was sacked and stored here before being loaded into rail cars on the adjacent spur track.

Additions
A 195' extension was built off the west end in 1920 using similar construction. The building currently measures approximately 75' x 715'.

SUPPORT BUILDINGS

Carpenter Shop (No. 9)

Date of Construction:	1905
Use:	Carpenter Shop (1905-82)
Demolished:	1992
Photos:	53, 54

Description
The Carpenter Shop was a one-story, gable-roofed, wood-frame building which measured approximately 33' x 85'. It was about 16' high at the eave and 25' high at the top of the gable ends. The exterior was painted wood siding. The building originally had seven large window openings across the west facade and four more at the north end of the east facade. These openings had sixteen-light over sixteen-light double-hung windows. There were seven smaller window openings with twelve-light over twelve-light windows at the north and south ends. Appraisal records from 1920 indicate there were were two pairs of 3' doors and two 4' wide doors into the building.

The walls were framed with 2" x 6" studs at 16" on center, with 1" x 10" horizontal wood siding. Wood trim occurred at corners, around openings and at the gable-end eaves. The building rested on a 6" x 8" wood sill plate. The roof was framed with wood trusses. Purlins supported the corrugated galvanized iron roofing.

Function and Use
The shop in this building served the carpentry needs of the Factory No. 1 complex.

Alterations
Window and doors were altered over time. The eave on the east side was cut off, probably with the construction of the adjacent Rotary Lime Kiln Building in 1907. This latter building was subsequently removed, re-exposing the east facade of the Carpenter Shop.

Pipe Shop (No. 11)

Date of Construction:	1898-99
Use:	Pipe Shop and pipe storage (1898-82)
Demolished:	1992
Photos:	55, 56

Description
The Pipe Shop was a one-story, wood-frame, shed-like structure which measured 105' x 32'. Building heights were 7'-6" at the eave and 14' at the ridge. The ridge was off-center to the west making the roof pitches different. The exterior was painted wood siding. The building had large door openings on the west, some with sliding doors. All of the other facades were apparently blank except for a rectangular window in the gable-end of the south wall. This window does not appear to have been original.

The building was a combination of plank and post and beam construction, with posts spaced at 8' on center. Center posts supporting the roof were 6" x 6". Perimeter posts at the walls were 4" x 6" and had girts and plates between. Vertical board siding, 1" x 12" on the east and 1"x8" with battens on the other sides, was nailed onto the plates and girts without intermediate framing. The roof was framed with 2" x 5" rafters, and originally had shingle roofing on 1"x4" spaced sheathing at 12" on center. Corrugated galvanized iron roofing was put on later. The floor was dirt.

Function and Use
The building contained the Pipe Shop and storage space for materials. The shop was used to support renovations and maintenance on buildings and equipment around the Factory No. 1 complex.

Alterations
The door openings were enlarged over time.

Main Office and Scales (No. 38)

Date of Construction:	1898-99
Architect:	William Weeks
Use:	Offices and scales for weighing wagons and trucks (1898-1958)
Alterations:	Scales rebuilt
Demolished:	c. 1958
Photos:	5, 57
Drawings:	28-33

Description

The Main Office and Scales building was a two-story, brick structure with elements of Victorian Romanesque detailing. It measured approximately 64' x 65'-6" in plan and was approximately 34' high at the eave and 55' high at the top of the pyramidal roof. Dormer elements projected from the roof at the center of each facade. The north or front facade was symmetrical about a central bay. The central bay was distinguished by an arched entry vestibule on the ground floor, an arched window at the second floor and a clock mounted in the end of the dormer at the roof. There were three windows to either side of the central bay on the second floor, and a similar fenestration pattern on the ground floor, with the exception of an additional door into the timekeeper's office at the easternmost bay. The east and west facades generally had four groups of paired openings on each floor, although the openings varied at the canopies above the scales attached to each side. The scale canopies had hip roofs which were supported on turned solid pine columns with decorative, arched wrought iron grills. The rear elevation was less symmetrical, with openings reflecting the irregular room divisions and uses on the interior. All window openings had double-hung windows. Openings on the ground floor were arched with sandstone voissors, while those on the second floor were rectangular and had sandstone lintels. Small arched windows occurred in the dormers at the side and rear facades.

Walls were 17" thick brick, including a 4" red, pressed brick face backed with 13" common brick. The walls were supported on concrete foundation walls and spread footings. Concrete piers supported interior columns. Interior partitions were generally 2" x 4" or 2" x 6" wood studs with lath and plaster. Floors were generally wood over joist framing. The roof was framed with 2" x rafters 4" x purlins and braces. The roof decking was 1" x 6" wood and the roofing material was slate.

Function and Use

The Main Office and Scales building was the public face of the Factory No. 1 complex. It housed the administrative staff of the factory. The first floor was subdivided into separate rooms including the Main Office, Timekeeper's Office and Weighing Room. There were also two private offices and an office for clerks. The company vault was near the center of the first floor. Stairs adjacent to the vault led to an open general work area on the second floor.

Scales were located under exterior canopies on the east and west sides of the building. Loaded wagons, and later trucks, would pull through and be weighed upon entering the factory grounds. The empty wagons or trucks could then be weighed leaving to determine the amount of the load.

Additions

The original scales, operable to 15 tons, were rebuilt for larger trucks in 1920 to a capacity of 30 tons. These in turn were replaced in 1949 with scales operable to 50 tons. [17]

RAW MATERIALS

Beet Bins (Nos. 30-35)

Date of Construction:	1897-98
Use:	Beet receiving from railroad cars (1899-1982)
Additions:	Narrow Gauge "High Line" Beet Bin (1901, reconstructed 1920)
	Broad Gauge "High Line" Beet Bin (1907)
Demolished:	1940s-80s
Photos:	58-60
Drawings:	36, 37

Description
Originally five identical bins were built. The bins or sheds were long, gable-roofed structures built of wood. Each measured 808' x 61' to the edge of the roof, and averaged 29' in height. The framing was exposed to the sides below broad eaves; the ends were finished with 1"x 12" horizontal wood siding. The sheds were framed in sixty-seven, 12' bays along their length with bents. Individual bents were generally made up of 4" x 6" and 6" x 6" members. The bents were supported on concrete piers. Roof construction was 4" x 6" rafters, with 1" x 4" spaced sheathing at 12" on center and wood shake roofing. A 12" concrete slab floor was later added.

Two tracks ran inside of each shed on a low trestle structure or track bent supported on concrete piers. Below the tracks angled wood planking directed the beets unloaded from the rail cars into one of two concrete ditches. Each ditch dropped 1/8-inch per foot toward a collector ditch at the west end. The collector ditch, or flume, washed and carried the beets toward the Main Building. At two locations along the way large, compartmentalized water wheels, called Beet Wheels, elevated the beets to a higher section of the ditch to maintain the proper slope (photo 60). The beet wheels were motor driven and submerged half-way below grade. One wheel was later replaced by an angled screw lifter.

Function and Use
The Beet Bins were the receiving areas for beets unloaded from rail cars; wagons could also unload into the sides of the bins.

Additions and Alterations
Narrow Gauge "High Line" (No. 35)
A trestle structure was built between the northernmost two sheds as an elevated beet dump in 1901 (photo 59). It was an 800' long trestle structure, made of 51 bents measuring 21' high. One track with multiple rails for both standard and narrow gauge cars ran on the trestle. On the ground below a peaked, wood-frame "beet cone" directed beets to concrete-lined ditches on either side of the trestle. The structure was rebuilt in 1920 and abandoned by the late 1940s.

Broad Gauge "High Line" (No. 34)
The broad gauge high line was a reconstruction of the northernmost shed in 1907. As with the adjacent narrow gauge high line, the reconstruction involved building an elevated dump

on a trestle. The construction remained basically the same as the original shed, but the roof was raised up to about 34'. Two tracks and two ditches ran inside the shed as before. About two-thirds of the shed was in use as a pulp warehouse by the late 1940s although this was vacant by the early 1970s.

Of the four bins or sheds south of the high line bins, two were still in use as beet dumps in the late 1940s. The roof had been removed from one and part of the track had been taken up. The other two sheds were in use for pulp storage. The twin track serving each bin had been replaced with a single line at all four sheds. By the early 1970s only one full warehouse shed (No. 32) remained, along with a portion of another (No. 30) adjacent to the sugar storage silos and packaging facilities.

Rotary Kiln Building (No. 58)

Date of Construction:	1906
Use:	Burning waste lime for reuse
Demolished:	1970s
Photo:	14, 18
Drawings:	38, 39

Description
This one-story building was a steel-framed, gable-roofed shed covered with corrugated galvanized iron siding and roofing. The building was rectangular in plan and the north end was not enclosed. Overall measurements were approximately 35' x 180', and the eaveline was 27-6" high.

The walls were framed with steel columns resting on cast iron column bases and concrete pier foundations. The roof was framed with steel purlins and the floor was 5" concrete slab on grade.

Function and Use
The shed housed two rotary kilns which were used to burn impure, wet waste lime and precipitates to obtain lime for several of the processing stages. In contrast, the kilns in the Boiler House could burn only dry lime rock. After the rotary kilns were installed much of the lime from the extraction processes could be reclaimed and recycled into the factory.

ENGINEERS AND ARCHITECTS

William Cochran Waters, Engineer

William Cochran Waters (1850-1929) was the engineer most directly associated with overseeing the design of the Factory No. 1 complex. He was born in New Brunswick, Canada in 1850 and moved to California with his family at the age of five. He returned to Canada for schooling in Novia Scotia, but came back to California following graduation and went to work for Risdon Iron Works in San Francisco. He was employed with the iron works and at the mines in Gold Hill, Nevada through the 1870s, including about a year on assignment with Risdon in Hawaii. Returning to San Francisco in the early 1880s, he became the assistant to the chief engineer at the Western Sugar Refinery owned by Claus Spreckels.

Spreckels knew Waters' work through the Western Refinery and through engineering and construction Risdon Iron Works had done on the Spreckels property in Hawaii. When the decision was made to build the beet-sugar factory at Watsonville, Spreckels chose Waters to engineer and oversee the construction of the plant. The Western Beet Sugar Company factory opened in 1889 with Waters as chief engineer and general manager. In addition to his duties at Watsonville, Waters was also named the superintendent and general manager of the Pajaro Valley Railroad in 1890 and the chief engineer of the Western Refinery in 1891.

When plans were begun for the Factory No. 1 complex in 1896, Claus Spreckels put Waters in charge of overseeing the design and construction of the new factory. Waters also traveled east to oversee the fabrication of some of the American-made equipment. He became the first general manager of the Spreckels Sugar Company, and when the Factory No. 1 complex opened in 1899 the Watsonville factory was closed. Waters operated the factory at Spreckels until his retirement in 1904.[18]

Charles L. Pioda, Engineer

Charles L. Pioda (1870-1949) was born in Oakland, California. He graduated from Santa Cruz High School in 1887 and went to work for the county surveyor's office. Later in the year he assisted on the survey for the site of the beet-sugar factory at Watsonville, and over the next several years he was occasionally employed on projects for Claus Spreckels. He assisted Thomas Wright with surveying the Pajaro Valley Railroad between Watsonville and the Moro Cojo Ranch in 1890, and worked on the extension of the railroad toward Salinas in 1891. Pioda also worked as deputy county surveyor for Santa Cruz County and city engineer for the City of Santa Cruz.

Charles Pioda began full-time employment with the Spreckels Sugar Company in September 1896. He began on surveys of Ranch No. 1 for the Factory No. 1 site and the Town of Spreckels. In addition to work at the factory site he completed the alignments for the Pajaro Valley Consolidated Railroad between Spreckels, Alisal and Buena Vista and later served as the superintendent and general manager of the railroad. In 1899, he was also placed in charge of engineering work for all of the Spreckels Sugar Company ranches.

Soon after Factory No. 1 was established it became evident that irrigation was going to be necessary to ensure a consistent crop of beets for the factory and Pioda was a pioneer in developing the ditches, pumping stations and wells on the Spreckels ranches in the Salinas Valley. With his knowledge of beet agriculture as well as engineering, he was appointed agricultural superintendent in 1912. At the time the company was farming about 30,000 acres in the Spreckels district, of which 20,000 acres were devoted to beets.

In 1919 Pioda was promoted to resident manager for the Spreckels Sugar Company at Spreckels. Throughout the rest of his career he continued to administer the ranches and irrigation systems, contributed to the development of a blight-resistant seed stock and oversaw the changes and modernizations of the factory complex itself. Pioda retired from the Spreckels Sugar Company in 1945.[19]

William Henry Weeks, Architect

William Weeks (1864-1936) was a prolific architect who worked throughout California beginning in the 1890s.[20] In addition to work for the Spreckels Sugar Company, Weeks is credited with numerous buildings in the Pajaro and Salinas valleys. He is best known for his later designs of school buildings, libraries and courthouses built during the 1920s and 1930s, at which time his practice was one of the largest architectural firms in the state.

William Henry Weeks was born in Charlottetown, Prince Edward Island, Canada. His family later moved to Denver where Will attended the Brinker Institute. He worked with his father, a builder and designer, in Wichita, Kansas and Tacoma, Washington before marrying and moving to Oakland in 1891.

Weeks was affiliated with the Christian Church, which brought him from Oakland to Watsonville to design the First Christian Church, built in 1892. Weeks opened his own office in Watsonville in 1894 and expanded to Salinas in 1897. He later had offices in San Francisco, Oakland and San Jose, at times maintaining them simultaneously, and worked in partnership with his brother, Hammond, and son Harold.

Work by Weeks for the Spreckels Sugar Company
Included in Weeks' work for Claus Spreckels were the Main Office and Scales, the school for the Town of Spreckels and several buildings on the ranch properties. Works attributed to Weeks include:

Factory No. 1 and Town of Spreckels
Main Office Building (1899)
School (1899)
40 Cottages (1898)

Ranches
Addition to Soap Lake Ranch House, Ranch No. 4
Barn at Soap Lake Ranch, Ranch No. 4
Cottages and barns for Soap Lake Tracts, Ranch No. 4
Pump station at Ranch 2 (1901)
Tool shed for Ranch 4 (1901)

Scale House at Ranch 4

Waters Residence

Weeks is now becoming recognized for his residential work. On the factory site he designed one of his finest homes for W.C. Waters, superintendent of the Spreckels operations. It was built in 1897-98 and burned in 1912. The building was a wood frame, two-story structure with a stone foundation and full basement. It contained fourteen rooms; two rooms were designed for use by Claus Spreckels whenever he visited Factory No. 1.

ARCHITECTURAL CONTEXT

The original Factory No. 1 complex was consistent in its detailing and materials, and to varying degrees its buildings incorporated composite construction of brick and steel. Although thoroughly modern in its construction systems for the time, the complex, and the Main Building in particular, can be seen as a variant at the end of one tradition in American industrial building which began with eighteenth century New England textile mills. The brick and steel structures built from the early 1890s updated the heavy timber and bearing wall system of typical mill and factory construction by incorporating the latest innovations in structural steel framing. But even with the advantages of the steel frame the buildings could not match the benefits of the reinforced concrete "daylight" factories which became popular after the turn of the century.

The first mechanized textile mill, the Slater Mill, was built in Pawtucket, Rhode Island in 1790. The New England countryside was well suited to industries dependent on water power, and by 1850 the building form was firmly established across the region. Soon the versatile building type was also being adapted by other manufacturing industries.

The early mills were constructed almost entirely of wood, a relatively inexpensive and abundant material in New England. Although the wood post and beam construction remained a constant feature, the exterior wood siding gradually gave way to stone, or more commonly brick, exterior bearing walls in response to the constant danger of fire. In a further effort to reduce risk, factory owners began to adopt "slow-burning" construction techniques from England by the 1830s. For manufacturers, many of whom were essentially self-insured through factory mutual insurance companies, the new construction system was a way to make buildings safer without increasing costs.

Slow-burning construction is characterized by large chamfered columns and beams capable of resisting damage by fire for a longer period of time, and double-layered plank floors which eliminated concealed joist spaces. Later American mills incorporated nearly flat plank roofs supported on large beams, thus eliminating more-combustible roof trusses or framing. The heavy timber and plank framing of slow-burning construction, with brick exterior bearing walls punctuated by window openings, can be considered "standard" or "regular" mill construction through the end of the nineteenth century.

In some ways the American mills and factories represented a conservative approach to the problem of fire, making buildings fire-resistive but not eliminating combustible materials. In England, although many mill owners still continued to use slow-burning construction throughout the nineteenth century, there was also a thrust toward "fireproof" mills with iron interior framing. Although not truly fireproof since iron can fail under the heat of a fire, at least the building itself was made of non-combustible materials. Iron was used in England as a structural material from the 1770s. The use of iron in mill construction dates from the early 1800s. In general cast iron columns and beams were used for framing, although later wrought and rolled iron were substituted for beams and girders. Common English construction practice by the 1890s included arched brick floors with a concrete topping, or concrete slabs supported by closely-spaced girders.[21]

Iron construction started in the United States in the 1820s and was employed through the 1890s. Cast iron columns were used in some mills and cast iron bases and column caps were often used with wood framing. Spreckels' Watsonville factory, although almost all wood including the exterior walls, had iron columns and even girders in some places for added stability.[22] But heavy timber was still considered "regular" construction for mills and factories even when business blocks were being built in cities with internal iron framing. Fireproof construction in factories along the English model existed in the United States, but innovations on the standard system seem to have gone in two other directions in the latter decades of the century. One innovation was to increase the depth of the brick wall piers inward between the windows, making them act more as columns to increase the available wall area for glazing. This left the exterior wall as still a load-bearing wall. The other direction was toward composite brick and steel wall construction similar to that of the Main Building (No. 1).

Steel framing was first used with iron in high-rise construction by Chicago architect William Le Baron Jenney in the Home Insurance Building of 1884. The first all steel-framed skyscraper went up in 1890, and over the course of the next decade Chicago architects in particular refined the riveted steel frame as a construction system. These buildings were also composite construction, often with brick infill between the frame at the outer walls and finer finish materials hung on the exterior. In California, this method of construction was used in such structures as the Union Depot and Ferry House (Ferry Building) constructed between 1895-1903. The steel frame was built by Risdon Iron Works, the firm responsible for the steel work at Factory No. 1, and the infill brick walls were finished with sandstone.

Steel framing was soon applied to factories, as was composite wall construction using steel with brick infill finished by a continuous facing of brick bearing its own load. A steel frame factory with concrete floors was built in England in 1895,[23] and at least three composite steel-framed and brick-clad buildings were built by the end of that year for manufacturers around Providence, Rhode Island. The contractor for these latter buildings was the Berlin Iron Bridge Company of East Berlin, Connecticut which appears to have been an innovator in the construction type for use in factories and workshops.[24] In 1898, the same year that Factory No. 1 was under construction, the Berlin Bridge Company built another steel and brick factory in Hartford, Connecticut.[25]

Many advantages were claimed for using composite wall construction in factories. The structural frame was strong, and since it carried the majority of the wall load to pad or pier foundations only a light foundation wall was required to support the walls of the first floor and the layer of exterior brick facing. The frame also allowed for larger window openings. Daylighting was a major concern at the time although it does not seem to have been maximized in the design for the Main Building. Another advantage was that owners could expand yet maintain the same general appearance as older buildings. Indeed the Main Building and the other buildings in the Factory No. 1 complex, while not responding to earlier buildings on the site, use the same Italianate and Romanesque Revival detailing factory builders of the time often adopted from residential or commercial buildings.

One disadvantage remained, however, which was the difficulty of truly fireproofing the steel. In skyscrapers the steel was naturally covered by finish materials on the exterior and interior, but in factories it was costly to sheath all of the exposed steel if additional fire

protection was desired short of installing fire sprinklers. A system was being developed, however, which offered the advantages of relatively unrestricted areas for exterior glazing and inherent fireproof qualities: the reinforced concrete frame.

By 1910 the concrete frame, with its strong utilitarian character and lack of ornament so appealing to early European modernists, became the dominant system for "daylight" factory construction. Buildings such as the Main Building at Factory No. 1, which can be considered an updated version of regular mill construction, became the end of a long design tradition.

[14]The Spreckels Sugar Company Assessment Book: Factory No. 1 and Town of Spreckels dates the conveyor to 1899; it first appears in appraisal inventories in 1900.
[15]*Salinas Index* (Weekly), April 19, 1906.
[16]Charles Derleth, Jr., "The Spreckels Sugar Mill," in *The California Earthquake of 1906* , ed. David Starr Jordan (San Francisco: A. M. Robertson, 1907), 196-200.
[17]Spreckels Sugar Company, Inc., *Sweet Nostalgia* (Pleasanton, California: Spreckels, c. 1982), 51.
[18]Charles L. Pioda, "William Cochran Waters," *Honey Dew News* (October 1942).
[19]"Charles L. Pioda, A Brief Biography," *Honey Dew News* (March 1945).
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III. SUGAR BEET AGRICULTURE AND PROCESSING

SUGAR BEET AGRICULTURE

Beet agriculture requires good soil, a temperate climate and plenty of water. It also traditionally required extensive field labor during the growing season, followed by a labor-intensive harvest. Many of the more labor-intensive operations have been mechanized, especially since the 1940s.

Beet Growing and Harvesting

Planting
Sugar beets are grown from seed. The sugar beet is a biennial plant, requiring two seasons to produce seed. For sugar production only, beets are harvested six to eight months after planting, with each beet weighing between two and ten pounds. Planting typically occurs from November to April and harvesting from August to November.

The plowing prior to planting and heavy work in later stages of the growing and harvesting of the beets was initially done with horse-drawn implements (photo 61). Steam engines were later used and then gasoline tractors (photos 62, 63).

Thinning
Each beet seed produces several plants rather than one. Thinning, traditionally done by hand but now also done with equipment, serves to remove all but one plant in the clump. Eventually a row is formed with plants approximately six inches apart.

Cultivating
Cultivating and weeding follow the planting for four to five months (photo 64). As the beet grows, the main root extends into the ground six or seven feet and sends out a lateral network of thread-like side roots. The enlarged upper portion of the main root is the source of beet sugar.

Harvesting
At harvesting the beet roots are lifted out of the ground, topped and loaded. Before the development of the mechanical harvester, farmers used lifters pulled by horses or tractors (photo 65). Workers then used the hooks of their beet knives to hook the beets at the stem of the plant and pull the beet from the soil. The beets were separated from the top plants with beet knives and tossed into wagons or trucks, or piled to be picked up by a loader (photo 66). The leafy green tops were used with the beet pulp as cattle feed or left in the field to enrich the soil. The loaded beets were then delivered to a receiving station by wagon or truck (photos 67, 68, 69).

Prior to World War II the industry had been developing a mechanical beet harvester and during the war there was a further push toward mechanization in response to an acute shortage of field labor. By the early 1940s harvesters were on the market. The Spreckels Sugar Company bought eight two-row Marion Beet Harvesters in 1944. Since the early 1950s virtually all harvesting has been mechanized (photo 70).

Beet Loading Stations

Beet loading stations were located at regular intervals in the growing areas along both the PVCRR and Southern Pacific Railroad lines. Early stations were elevated ramps for wagons or light trucks (photos 71, 72). There were two basic types of stations. In one type the side of the wagon dropped and the wagon bed or the entire platform tilted to unload the beets (photos 73, 74). In the other type the side dropped on the wagon and the beets were lifted out with a net and a crane (photos 75, 76). Trucks were later used, with tilting beds lifted by a crane (photos 77).

From the receiving stations in the growing areas the beets were shipped to the Factory No. 1 site on the railroad and deposited at the Beet Bins (photo 78). Some beets also arrived at the bins or dumps directly by wagon or truck (photo 79). At the bins the beets were dumped into the beet ditch, or flume, which washed and carried them to the Main Building.

PROCESSING AND EQUIPMENT

Sugar Processing Terminology

A *mill* processes cane to raw sugar. It is usually located where the cane is cultivated. From the mill the raw sugar is shipped to a *refinery* where it is refined to white sugar. The term *factory* usually applies to sugar beet processing. Factories are generally near the growing areas and typically contain the entire sugar production process, including packaging.

Sugar Beet Processing in Factory No. 1

Processing at Factory No. 1 required many operations, both in the Main Building and the supporting adjacent principal buildings. Extracting sugar from beets included the following major stages: washing, cutting, diffusion, carbonation, filtration, evaporation, boiling, crystallization, centrifuging, drying and packaging. The end products were sugar, molasses and cattle feed.

It should be noted that most of the equipment at the Factory No. 1 site was removed prior to the preparation of this report and few drawings exist of the installations. Therefore only a limited documentation of the process is possible. The initial process and equipment will be described from available historic sources, and this will be updated when possible to describe the operation of the factory before the factory closed. Although by the 1970s very little of the original equipment was still in place, many of the basic processing stages remained essentially the same.

The stages of the extraction process are described for the Main Building, and the locations of the original equipment can be found on plan and section drawings dating from the original construction (drawings 38-41). Major steps are numbered; intermediate steps and explanatory notes are indented. Additions or alterations to the process are noted as known. The equipment in the Main Building shortly before it was closed is indicated on an equipment plan from 1980 (drawings 42-46). Following the section on the Main Building, operations in other buildings are described and related drawings referenced.

Sugar Extraction, Processing and Packaging: Main Building (No. 1)

1. Arrival
Beets were floated from the bins or dumps to the southwest corner of the Main Building in the main beet ditch. The ditch terminated at a Beet Distributing Wheel which distributed the beets into four separate concrete flumes that penetrated the foundation wall of the building. This southwest part of the factory was called the Wash House (drawing 47).

Additions/Alterations
The Beet Distributing Wheel was replaced with a screw lifter in 1977.

2. Washing
Upon entering the Wash House the beets, already rinsed in the beet ditch, were raised by lifters or conveyors to the washers. From the washers they were sent into the beet elevators and lifted to the top of the building. A conveyor or beet carrier then deposited them into the

large beet hopper or bin at the level of the fifth floor. From the hopper the beets dropped through automatic scales into the slicers.

3. Slicing
The slicers consisted of knives attached to a rotary drum; each slicer had sixteen knives. The beet slices were called "cossettes."

Additions/Alterations
New slicers were installed in 1937. The slicers used Konigsfelder knives which were attached to a Ogden rotary-drum slicer. The beet slices were continuously weighed by a Merrick weightometer.

4. Diffusion (Cossettes and Hot Water to Raw Juice and Wet Pulp)
The diffusion battery was invented in Austria in 1864. Prior to this procedure the beet was held against a rasp and the resulting pulp was then separated from the juice. The diffusion battery employed the relatively new theory of osmosis, where the sugar was removed from the cells of the beets in a bath of hot water.

There were originally four diffusion batteries at Factory No. 1, each consisting of a linked row of fourteen tanks or cells. The factory used Roberts batteries which used a batch method of diffusion. Hot water was circulated through each cell in series, passing through a total of ten cells before being drawn off to the saturation or carbonation tanks. At any given time the other four cells in line before or after the ones in use were being emptied, washed and refilled with fresh cossettes (photo 80).

Two products, raw juice and wet beet pulp, were the end results of the diffusion stage. The raw juice went to tanks for automatic measuring. The beet pulp was emptied from the cells, sent through a press to relieve it of some of its water, and piped out of the building. A discussion of beet pulp follows under the heading of By-product Processing.

Raw Juice Heaters
The raw juice from the diffusers was heated prior to the carbonation stages (drawing 48).

Additions/Alterations
A fifth Roberts diffusion battery with twelve cells was brought from Watsonville and installed, along with two new cells, in 1915-16.

The Roberts batteries were replaced in 1949 with a twenty-eight cell Oliver-Morton continuous diffuser to increase capacity. Continuous diffusion batteries were placed outside of the Main Building to the west and were also located inside as indicated on the 1980 equipment drawing. The Oliver-Morton diffuser was developed at the Woodland plant of the Spreckels Sugar Company during 1948. It was invented by W. V. Morton, who had been a company employee. With the new diffusers capacity increased by more than 1,000 tons.

The continuous diffusion battery was installed on a slope with each cell higher than the preceding cell. Hot water flowed into the top cell and worked its way down to

the low end through pipes connecting the cells. The cossettes entered the lowest cell and were moved from one end of the cell to the other by a scroll, and from one cell to the next by means of a set of fingers which lifted them up. In this fashion the freshest hot water encountered the most sugar-exhausted cossettes and the sweetest water came into contact with the sweetest cossettes.

For conservation purposes the water pressed from the pulp after diffusion was recycled back into the diffusers beginning in the 1950s or 60s. This eliminated some of the settling ponds which had typically covered the factory site between the Main Building and the river.

5. First Carbonation and Filtering (Raw Juice to First Carbonation Juice)

The raw diffusion juice, which typically had a sugar content of approximately 10-15 percent, was dark and full of impurities as it arrived at the carbonation tanks. The original system at Factory No. 1 was a batch carbonation process, since each individual tankful was treated as a batch. The juice was combined with milk-of-lime (a suspension of lime in water) in the carbonation or saturation tanks. The lime was then precipitated out of the juice solution by adding carbon dioxide. As the lime precipitated out of the solution it also took out impurities. The resulting precipitate of calcium carbonate and non-sugar impurities was filtered from the juice in filter frame presses (drawing 49, photo 81).

In the filter presses, also called plate and frame presses, the juice passed through frames holding jute filter cloths or burlap, leaving the precipitate pressed into soft dough-like cakes between the layers of cloth. The cakes were dried and used as fertilizer or (after 1906) burned in the rotary kilns to recapture the lime.

The carbon dioxide gas and the milk-of-lime used in this step were produced in the Lime Kilns (see the Lime and Carbon Dioxide Production section on p. 64).

Additions/Alterations
After 1905, saccharate milk from the Steffen Process was also added to the raw juice in the carbonation tank. Sweetland filters, a type of pressure leaf filter used in the first and second carbonation cycles, were installed in 1916. In pressure leaf filters the filter leaves are mounted within a pressurized chamber. The batch first carbonation equipment from the original installation was replaced with a Dorr continuous carbonation system in 1932 and this type of equipment was used until 1982. Two additional Sweetland filters were also installed in 1932, and rotary vacuum filters, generally used to desweeten the combined precipitates from the carbonation cycles and the thick juice filters, were later added. The rotary vacuum filters consisted of a rotating drum filter in a tank. The drum rotated through the liquid and, with the assistance of varying air pressure, solids were collected on its face and are then removed.

The Dorr process was a continuous system for the first and second carbonations. The juice continually flowed through the tanks rather than being treated in batches. The first carbonation equipment consisted of two cylindrical tanks, the primary and secondary tanks. The primary tank received the raw juice which was mixed together

with the recirculating juice from the secondary tank. As the juice overflowed into the secondary tank the milk-of-lime or saccharate milk was added. Carbon dioxide was added in the secondary tank, also known as the "gassing" tank. Saturated first carbonation juice was drawn off to a clarifier or thickener located adjacent to the secondary tank. The clarifier eliminated the suspended solids from the juice through sedimentation to the bottom of the tank. The sludge or mud was pumped from the thickener and washed with water in the rotary vacuum filters. The resulting sugar water was reused in the first carbonation cycle. After the water was evaporated from the mud the remaining lime compound was used as a soil conditioner or burned in the rotary kilns. After reheating, the first carbonation juice was pumped to the second carbonation tanks.

6. Second Carbonation and Filtering (First Carbonation Juice to Thin Juice)
This step was similar to the first carbonation cycle. The precipitate of calcium carbonate and non-sugar impurities was again filtered from the juice in the filter presses.

Sulfitation and Filtering
The thin juice was then passed into tanks where sulfurous acid gas made from burning sulfur was injected to bleach or lighten the solution and remove salts. After the sulfur saturation the thin juice was filtered again (drawing 50).

Thin Juice Heaters
The thin juice was pumped to a holding "evaporator supply" tank and then heated prior to entering the evaporators.

Additions/Alterations
The second carbonation became continuous rather than batch in 1932. After that time, Kelly and Sweetland filters, both types of pressure leaf filters, were used instead of the older frame presses to filter the carbonation juices. In later years sulfitation was done with liquid sulfur dioxide and the related filtering step was eliminated.

7. Evaporator (Thin Juice to Thick Juice)
Evaporation of water from the sugar juice was done in two separate stages. The first stage involved a series of evaporators which reduced the thin juice from the carbonation tanks to thick juice that contained 50-60 percent sugar (photo 82). The second stage involved the vacuum pans discussed below in step #9.

The evaporators, called quadruple effect evaporators, consisted of bundles of tubes (calandria) inside steel compartments or steam chests. The thin juice was pumped into a compartment. Steam was put through the tubes, causing the juice to boil and lose moisture; the vapor from the juice was then used in the next compartment or "effect." The system allowed for multiple use of the same heat energy and resulted in decreasing pressures and temperatures as the juice proceeded through the effects. Four evaporations or effects were done within one evaporator.

In addition to the quadruple effect evaporators there were two double effect evaporators installed at Factory No. 1.

Thick Juice Heaters
The thick juice was heated prior to filtration and further evaporation in the vacuum pans.

Melters
Melters, as their name suggests, served to melt down lower-grade sugars from the centrifugals (step #10). The melted sugar was fed back into the thick juice coming out of the evaporators for further processing. There were two types of melters: high and low.

Additions/Alterations
Continuous Absorbtion Process
The Continuous Absorption Process (CAP) was a filtering process introduced in the 1960s. CAP removed the amber color from the thick juice. In typical installations at the Spreckels factories the CAP columns were 47.5' high and contained 62,000 pounds of carbon in a 31' high bed. The installation at Factory No. 1 had five columns and was located just outside the Main Building to the west. The columns were linked together in a continuous feed system; the juice entered the column from the bottom and was drawn off through the top. In the process, carbon particles trickled down through the column picking up impurities and taking the color out of the thick juice. The spent carbon was withdrawn and sent through another "desweetening" column where the sugar was removed and the carbon cleaned.

With the addition of the CAP equipment, the thick juice went from the evaporators to surge tanks, then to the thick juice heaters, through the CAP tanks and the melters to the standard liquor filters.

The evaporators were replaced in 1977. The new evaporator station had seven quintuple effect evaporators.

8. Thick Juice Filtration/Standard Liquor Filters (Thick Juice to Standard Liquor)
The thick juice was filtered again in plate and frame presses to remove any remaining impurities.

9. Crystallization/Vacuum Pans (Standard Liquor to Fillmass)
The standard liquor entered the vacuum pans and through boiling became a very concentrated syrup (photo 83). A small amount of powdered sugar was injected to begin the crystallization of the sugar out of the syrup. After allowing the crystals to "grow" to the desired average size, the pan was emptied. The resulting thick, brown slurry of sugar crystals and syrup was called fillmass.

There were three types of vacuum pans: the white, intermediate and raw pans. The standard liquor went through a white vacuum pan first. After crystallization the resulting fillmass was sent through a mixer, and then centrifuged to separate the sugar crystals from the syrup (see step#10). The sugar from the first, or white, centrifugal was sent for packaging while the syrup by-product was sent to an intermediate vacuum pan. From the intermediate pan the fillmass was again sent through a mixer and centrifuged. The sugar from the intermediate centrifugal was sent to the high melter and the syrup by-product was

sent to a raw vacuum pan. The fillmass from the raw vacuum pan was sent to crystallizers and then to a mixer before being dropped into a raw centrifugal. The sugar from the raw centrifugal was sent to the low melters while the syrup by-product, known as molasses, was at first used for cattle feed. After 1905, the molasses was sent through the Steffen Process described below to extract more of the remaining sugar.

Crystallizers
After the fillmass left the raw vacuum pans it went to crystallizers (photo 84). These were cylindrical tanks where crystallization was allowed to continue, recovering more sugar from the low-grade syrup. From the crystallizers the fillmass went to the raw mixers.

Mixers
There were mixers associated with each of the white, intermediate and raw vacuum pans. The mixers controlled the quality of the fillmass fed to all of the respective centrifugals. Uniform grain size, density, fluidity and temperature needed to be maintained. The mixers had stirring mechanisms which prevented the fillmass from solidifying while it cooled. Crystallization continued slowly in the mixers before the fillmass was dropped into the centrifugals (drawings 51, 52).

Additions/Alterations
One vacuum pan was removed and shipped to the Western Sugar Refinery in 1923. Another pan (No. 7) was installed in 1937. Four additional crystallizers were installed in 1934, and all of the crystallers were replaced with four Werkspoor continuous crystallizers in 1957.

10. Centrifuging (Fillmass to Wet Sugar)
From the mixers the fillmass was poured into high speed centrifugals. The centrifugals were revolving cylinders with perforated sides. The syrup was thrown to the sides and drained off leaving the crystallized sugar.

Three types of centrifugals were used: the white, intermediate and raw. Each was associated with the respective type of vacuum pan and mixer. The white centrifugal separated the initial sugar crystals from the brown syrup. This was the highest quality of sugar produced. The resulting crystals went directly to the dryers (see step #12). As mentioned above, the remaining syrup passed through two additional types of vacuum pans and centrifugals, which yielded intermediate and raw sugars. These lower-quality sugars were sent to a melter and added back into the standard liquor. The white and intermediate centrifugals were batch centrifugals. In later years the raw centrifugals were a continuous system.

Additions/Alterations
Eight additional centrifugals were installed in 1909. These and the original centrifugals were run off the main steam engine through belt drives. Electric centrifugals—ten white, five intermediate, and fourteen raw—were installed in 1957.

11. Drying
From the centrifugals the sugar went through hoppers to the granulators. The sugar from the centrifugals still contained moisture. The moisture was removed in dryers or granulators, rotating drums through which hot air was passed (drawings 53, 54; photo 85). After cooling the sugar was ready for packaging.

12. Packaging
The sugar was put into hoppers and went through fillers into barrels or sacks. It was weighed and shipped to San Francisco for final refining.

Additions/Alterations
Final refining, which mainly involved improved color removal techniques, was begun at Factory No. 1 in 1904. From that time on packaging activities changed often in response to new products. Over time, packaging operations were distributed in several locations in the Main Building, mainly in the sugar end. A separate packaging facility was built in 1967.

Steffen Process: Extraction and Steffen Building (No. 4)

As described in the Architecture and Design section, the Extraction Plant was built in 1905 to house the Steffen Process, and the adjacent carpenter shop was remodeled to house the required filter presses. The Extraction Plant was extended in 1920 and the resulting two-part structure was referred to as the Extraction and Steffen Building. The purpose of installing the Steffen Process was to recover additional sugar that still remained in the molasses after the standard extraction steps.

Molasses Processing

Molasses is the final syrup spun off after repeated crystallizations in the extraction of sugar. It carries with it 12-16 percent of the sugar from the beets and is also high in nitrogen. In Europe, beet molasses is valued for stock feed and is also used for producing alcohol and baker's yeast .

In the U.S. it has been cost effective to desugarize the beet molasses. At Factory No. 1 the batch Steffen Process was employed to desugarize molasses beginning in 1905. In 1934, the Spreckels Sugar Company engineers developed the Continuous Steffen Process which eliminated the Steffen batch coolers.

Steffen Process

In the Steffen Process the molasses was treated with a basic solution. At Factory No. 1 finely ground lime was used. Milk-of-lime and molasses diluted in water were combined, cooled and allowed to mix in a mix tank. The lime combined with the sucrose in the molasses to form a precipitate, calcium saccharate, that settled to the bottom of the tank and was filtered out. The washed precipitate was called "cold cake." After this "cold" filter, the remaining liquid was heated which made most of the remaining sucrose combine with the remaining lime. The resulting precipitate was allowed to settle out in a clarifier or thickener and washed in a "hot" filter. This precipitate was known as "hot cake." The desugared liquid from the clarifier and hot filter was known as Steffen filtrate and was originally discarded.

The two batches of sugar-lime precipitate were formed into "saccharate cakes" and mixed with water to create a slurry called saccharate milk. The saccharate milk was then directed back into the first carbonation cycle (see step #5) where the lime bonded with carbon, freeing the sugar.

The original Extraction plant relied on filter frame presses in the end of building No. 3 to filter the precipitate from the diluted molasses. When the expanded Steffen and Extraction Building was built in 1920, Oliver filters were installed. These were a type of continuous rotary vacuum filter. The Steffen process at Factory No. 1 was eventually replaced with the Spreckels Continuous Saccharate Process.

CSF & Later Steffen Processes: New Steffen Addition & CSF Building (No. 1B)

The Spreckels Continuous Saccharate Process

This process was developed by the Spreckels Sugar Company and was installed outside the south end of the Main Building in the late 1960s. The process removed the sugar from the molasses in one combined operation. The diluted molasses was dropped into a mixer with milk-of-lime and the mixture was diluted with cold water. The solution was then pumped through a refrigerated heat exchanger to a funnel-shaped vortex pot where powdered lime was added. From there the diluted molasses and lime solution passed to a reaction tank where the precipitate was allowed to form completely. The particles that formed were then filtered out to make the saccharate cakes. The saccharate cakes were then used to make the saccharate milk, which was added back to the carbonation cycle.

Concentrated Steffen Filtrate (CSF) Process

The CSF process was installed after World War II to make use of the Steffen filtrate which had previously been discarded. The installation, which produced a syrup-like liquid through deliming and concentrating (evaporating) the Steffen filtrate, was for the International Minerals and Chemical Corporation, which used the concentrated filtrate to make the food additive monosodium glutamate (MSG). During the 1960s International Minerals developed synthetic ways of producing their products. The CSF was then added to the wet pulp entering the pulp dryer to enrich the animal feed.

Lime and Carbon Dioxide Production: Boiler House (No. 2) and Rotary Kilns (No. 58)

The Carbonation Process and the Steffen Process required a steady supply of lime for continuous operation. The Carbonation Process also required carbon dioxide gas. Both the lime and carbon dioxide were produced in a process called calcining, where either limestone or carbonated waste lime was heated in a furnace or kiln and reduced to a powder. At Factory No. 1, limestone was burned in the Lime Kilns in the Boiler House and carbonated waste lime from the settling ponds was burned in the Rotary Kilns.

The calcining produced calcium oxide (lime) and carbon dioxide gas. The carbon dioxide was removed at the top of the kilns and pumped into the carbonation tanks. The calcium oxide was allowed to cool, after which it was removed from the bottom of the kiln for use in the carbonation cycles and Steffen Process.

Boiler House Lime Kilns

At Factory No. 1 the lime kilns were of the type called a "vertical shaft" or "Belgian" kiln. Two kilns were originally built at the south end of the Boiler House; a third kiln was added in 1920-21 (drawings 55-7). Belgian kilns, which consist of two truncated cones, are built in two types: mixed-feed and gas. The mixed-feed type is fired with a solid fuel of high carbon content such as coke or anthracite, while the gas type is fired by direct injection of gaseous fuel. Factory No. 1 employed the mixed-feed type, which had several advantages. It was mechanically simple, fuel efficient and required a lower capital investment. The main disadvantage was the handling of the solid fuel, which at Factory No. 1 was coke.

The coke was mixed with limestone, also called lime rock, and dropped into the top of the kiln from buckets that ran overhead on the lime rock hoist and trestle. A swivel chute at the top of the kiln distributed each "charge" of coke and limestone in different directions to assure even loading onto the existing cone of coke and limestone. Portholes at the top provided outlets for the carbon dioxide gas. The gas was continuously pumped away and the cooled lime was continuously removed from the bottom of the kiln. Inspection holes were provided throughout the kiln for monitoring the reactions.

Calcining is considered more of an art than a science. Since the physical and chemical qualities of limestone vary, careful monitoring of the heated cone is important for uniform calcining. In large kilns the transit time of the solids from start to finish is approximately twenty-four hours.

Rotary Kilns

Rotary Kilns were used for the reclamation and burning of pond lime. The cost of high-quality limestone for Factory No. 1 was great enough to justify the construction of the rotary kilns in 1906. Unlike shaft kilns, the rotary kilns were able to burn wet material from the settling ponds and the carbonation cakes from the filter frame presses.

There were two rotary kilns at Factory No. 1. The kilns were about 85' long and consisted of cylindrical shells set at a slight angle and lined with refractory brick. The raw material was fed into the upper end of each kiln. The kiln turned slowly as the material flowed through and was burned. At Factory No. 1 the rotary kilns were gas fired.

Lime Slaking

To be useful in the carbonation tanks and in the Steffen Process, the calcined lime produced in the kilns was converted into a slurry called milk-of-lime, which is a suspension of calcium hydroxide. Lime slaker equipment used to produce the milk-of-lime was first located in Room 2A of the Boiler House. When that room was converted into the engine room for the extraction plant, the lime slakers were installed adjacent to the kilns (drawing 58).

The lime slakers promoted the formation of the suspension by agitating a mixture of calcined lime and hot water. At Factory No. 1 there were two lime slakers. They consisted of two parallel horizontal drums mounted on trunnions or pivots. A pulley system operated a series of paddles along a shaft in the drum. The lime and liquid were added at one end and passed through the paddles and a screen at the other end. The screen separated the solids, which were discharged as waste. The waste consisted of unreacted coke, spalled fire brick, unreacted limestone and other impurities.

Steam and Electrical Power:
Boiler House (No. 2) and Addition, Main Building (No. 1) and Generator Rm. (No. 1A)

Steam Power Plant
The Boiler House originally contained twenty-six water tube boilers capable of producing 125 h.p. each (photos 86, 87). Four economizers, used for pre-heating the water with the boiler exhaust, were installed above the boilers in 1900 (drawing 59). The boilers were originally run on oil; the factory switched to natural gas in 1931.

The boilers supplied steam and heat to processing equipment in the Main Building, and also served to run steam engines which powered equipment throughout the principal buildings by means of belt drives (drawing 60). Originally two steam engines were located on the ground floor of the main building and another engine was located in building No. 3. In 1905, two engines were installed in Room 2A of the Boiler House to run the Steffen Process.

Two more boilers were installed in the Boiler House Addition in 1911. These boilers provided steam between campaigns, mainly for the electrical plant, so that the Boiler House could be shut down. Two new boilers were installed in the Boiler House in 1950, and another in 1978. These three boilers replaced the twenty-eight boilers in the Boiler House and Boiler House Addition. By the late 1950s most equipment was powered by electricity rather than by steam engines.

Electric Power Plant
Electricity was originally supplied by four electrical generators (run off steam engines) located in the center of the Main Building on the ground floor. An additional generator was located on the second floor of the Main Building. The generators combined to form a 10,000 ampere electrical plant which supplied the lighting system and small DC electrical motors distributed throughout the principal buildings that powered equipment.

Over time processing equipment powered by steam was replaced in favor of electrically-driven equipment. After World War II, as the need for electricity increased, Factory No. 1 switched to AC power. In 1950 the first turbogenerator was installed. It produced 3,000 kilowatts at 4,160 volts. A second turbogenerator was added in the late 1950s with a rating of 4,000 kilowatts at 4,160 volts.

Pulp Processing: Pulp Dryer Building (No. 118) and Pulp Warehouse (No. 117)

The wet pulp leaving the Main building after the diffusion stage was originally dumped into silo pits and used for cattle feed. Although pressed, it still contained moisture and was difficult to store and transport.

Pulp drying technology was developed in Germany in the late nineteenth century. A pulp dryer plant with five units was built at Factory No. 1 in 1916 and an additional unit was added the following year (drawing 61). The dryer units were manufactured by the Stearns-Roger Mfg. Co. of Denver and included Büttner Meyer dryer drums. The pressed pulp was fed into one of the rotationg dryer drums. The drums contained baffles which directed the pulp through hot flue gasses from the furnace (photo 88).

The dried pulp was sent by conveyer and scrolls to the warehouse where it was sacked and stored. Dried pulp was typically sacked into fifty or one-hundred pound bags made of paper or burlap. In North America the practice of sacking the pulp diminished in favor of bulk storage and sale. This was also the case at Factory No. 1. In addition to the original Pulp Warehouse (No. 117), pulp was stored in the Bulk Pulp Warehouse (No. 408), built in 1957, and in the disused Beet Bins.

IV. RELATED ELEMENTS

The Factory No. 1 site was related to the surrounding area in many ways. The beet sugar industry changed the character of agriculture in the Salinas Valley, and the factory was closely tied to company-controlled ranches throughout the valley and beyond which supplied the sugar beets. The ranches were in turn dependent on successive groups of migrant laborers, which were reflective of larger patterns in farm labor in California. The railroad and irrigation systems established by Claus Spreckels and the Spreckels Sugar Company provided the infrastructure for growing and transporting the beets processed at the Factory No. 1 site. In addition, adjacent to the Factory No. 1 site is the company town of Spreckels, which was home to many Spreckels Sugar Company employees from the start. Although detailed, descriptive historical discussions of these topics is beyond the scope of this report, the following section reviews these related elements to provide a broader context for the Factory No. 1 site.

AGRICULTURE IN THE SALINAS VALLEY

Beginning in the late 1880s, sugar beet agriculture led a revolution in agricultural practices in the Pajaro and Salinas valleys. Prior to that time, wheat had been the dominant crop in the Monterey Bay area valleys. Barley was also widely grown and other crops included alfalfa, potatoes, beans, and in the Pajaro Valley, fruit and strawberries. There were also dairy farms in the valleys, along with cattle and sheep ranches on the drier and foothill portions of the area.

With Claus Spreckels' Watsonville factory, Factory No. 1 and related transportation networks, sugar beets became a dominant cash crop in the Salinas Valley, and the wider planting of non-grain crops was encouraged. Although at any given time sugar beets were planted on only 25,000 acres of the perhaps 120,000-150,000 acres devoted to agriculture in the valley, the returns on beets were better than those on grain for the tenant farmers and independent growers. Area sugar beet production over time is shown in the following table (fig. 5).

The irrigation systems introduced for the Spreckels ranches were also used for the other crops grown in rotation on the 60,000 acres the company controlled. Some of these crops had previously been dry-farmed and production increased with irrigation. Independent growers of beets and other crops also increasingly irrigated their lands. The development of the narrow gauge railroad, the Southern Pacific Railroad and the port at Moss Landing also meant that the valley's production could be linked to the demands of national and international markets. The transportation networks and irrigation combined to produce a rapid rise in the agricultural diversity and productivity of the valley.

The successful and widespread introduction of irrigation also eventually led to the decline of sugar beets in the Salinas Valley as growers turned to vegetable crops beginning in the 1920s. The main crop then became lettuce and the valley became known as the "salad bowl."

CROP YEAR	ACRES PLANTED	TOTAL TONS HARVESTED	AVERAGE TONS PER ACRE	AVERAGE SUGAR
1899	22959	175388	10.37	- - -
1900	15150	83256	7.98	- - -
1901	21198	271318	13.23	14.70
1902	20197	199084	11.36	14.60
1903	12511	141439	12.35	15.50
1904	11874	146120	13.10	13.70
1905	17373	167158	10.79	17.30
1906	19227	196665	10.95	18.40
1907	10913	110064	12.36	17.44
1908	14131	154452	12.76	18.59
1909	15542	193866	12.85	18.36
1910	18131	202850	11.75	19.51
1911	17975	191254	11.32	17.70
1912	15146	159880	10.79	19.23
1913	17644	140216	8.79	19.11
1914	23889	183177	9.73	19.10
1915	27100	326832	12.40	18.82
1916	27955	315816	11.89	17.89
1917	25594	282212	11.20	19.11
1918	18706	201523	11.35	15.80
1919	32219	211888	7.24	18.91
1920	28534	260692	9.50	18.00
1921	32482	223384	7.69	18.40
1922	16369	91267	7.28	18.98
1923	13227	135868	10.63	18.10
1924	20040	169566	8.78	18.69
1925	16222	102807	6.71	19.46
1926	7343	68786	9.54	19.95
1927	6020	37764	6.47	19.57
1928	680	8104	13.03	18.90
1929	197	3457	17.55	17.94
1930	262	4368	16.67	17.99
1931	1468	23287	17.80	18.78
1932	8776	124614	14.65	18.91
1933	18602	327689	17.90	19.73
1934	17430	266431	15.56	20.00
1935	17820	215858	12.43	19.23
1936	17693	306251	17.60	19.23
1937	15475	247744	16.79	18.80
1938	27048	425206	16.21	17.87
1939	23638	517160	21.88	18.36
1940	31073	576932	18.84	17.95
1941	21677	344421	17.40	17.72
1942	27125	410780	15.61	17.64
1943	12626	208961	18.49	18.49
1944	17047	317269	20.00	18.16
1945	22052	441827	20.57	17.67
1946	24900	466533	18.92	17.23
1947	30267	614016	20.59	16.69
1948	27717	429272	16.10	15.58
1949	14602	323263	22.81	17.29
1950	26468	559059	22.00	15.75
1951	18532	366225	20.30	15.33
1952	13427	267731	20.82	15.68
1953	16007	367766	23.70	16.12
1954	18588	417578	23.10	15.93
1955	14312	319462	21.70	15.35
1956	13337	301183	23.37	15.30
1957	16292	404320	25.12	15.44
1958	16675	382614	23.87	14.28
1959	16284	473898	29.66	15.43
1960	18968	494161	26.28	15.41
1961	23170	566766	24.74	14.54
1962	19457	371572	20.02	14.31
1963	17385	452775	27.17	14.77
1964	21539	577359	27.02	15.05
1965	18586	349004	19.10	13.80
1966	11015	263121	24.65	14.61
1967	10444	250400	25.49	14.20
1968	9022	288876	31.93	15.28
1969	10736	265572	26.38	14.87
1970	8472	283861	33.93	16.08
1971	14448	397999	28.50	14.75
1972	12995	460810	36.44	13.98
1973	4582	119123	27.11	15.16
1974	5568	177509	31.92	14.64
1975	14433	468638	33.18	15.32
1976	14327	508804	36.31	13.87
1977	10184	329306	33.82	14.90
1978	5383	150475	29.66	14.73
1979	7743	250293	32.90	13.73
1980	9448	293580	31.68	14.97

Fig. 5. Sugar beets grown in District One in the Salinas, Pajaro, Santa Clara and San Juan valleys. The majority of the beet growing acreage was in the Salinas Valley.

SPRECKELS SUGAR COMPANY RANCHES

The Spreckels Sugar Company both contracted with growers for beets and directly purchased or leased land for production. The principal beet growing areas related to Factory No. 1 stretched northward as far as San Jose and Milpitas, but were mainly centered from the Pajaro Valley around Watsonville, south through the Rancho Moro Cojo to the Salinas Valley. The Salinas Valley was originally divided into four or five districts and the other valleys were referred to by name (drawings 62-67). When other factories opened, the districts in the Salinas and neighboring valleys were grouped under District One, centered at Factory No. 1. While little information exists on specific parcels belonging to independent growers who were under contract with the company for sugar beets, some information is available on property the company once controlled.

The individual parcels of land purchased or leased by the Spreckels Sugar Company, which were often not contiguous, were grouped into "ranches" for management. The ranches were designated with numbers but were also commonly referred to by name. For the sake of clarity the numbers will be used in this report. Acreages for each ranch varied from season to season, depending on the ownership and lease status of the constituent parcels.

Once under company control, the land was either farmed directly or leased to tenant farmers. Improvements to the properties included buildings; windbreaks; and wells, pumps and ditches for irrigation (drawing 68, photo 89). Aside from irrigation systems and sometimes cottages or barns, tenants were generally responsible for their own improvements. The tenants received assistance from the company in growing sugar beets. In addition to beets, the company planted other crops in rotation on its properties. These other crops included hay, wheat, barley, beans, alfalfa and vegetables.

Ranches covered in this subsection were established by the Spreckels Sugar Company through the early 1920s and appear to be the company properties most closely associated with the operations at Factory No. 1. Additional growing areas were controlled by the company in other areas, especially after the opening of other factories beginning with the Manteca facility in 1917, but in general it was preferable to process the beets at the factory nearest to each field. While not the source of the entire sugar beet supply for Factory No. 1 over time, the ranches described here do serve to demonstrate the impact that the factory had on the agricultural and land ownership patterns of the Salinas Valley beginning in the late 1890s.

Early Development 1895-1899

With the start of land purchases for Factory No. 1 in 1895, through the time the factory opened in 1899, the Spreckels Sugar Company acquired the majority of the land it would eventually own in the Salinas Valley and established the first six ranches.
Initial purchases at Ranch Nos. 1-4 and 6 totaled almost 29,800 acres. Ranch No. 5 was land on the Moro Cojo Rancho which had been leased by Claus Spreckels beginning in 1888. The company leased additional land at Ranch Nos. 1-3, and tenants farmed portions of Ranch No. 1 and all of Ranch Nos. 4 and 5, but the emphasis was on company farming on company-owned land to secure an adequate supply of beets. All of Ranch No. 4, some 9,700 acres, was sold in 1909, and other small amounts of land were bought or sold by the

company into the 1920s. These early ranches, however, remained the core of Spreckels Sugar Company operations in the Salinas Valley until after World War II.

Lease Expansion 1905-1921

Beginning in about 1905, and continuing steadily into the 1920s, the Spreckels Sugar Company added to the acreage it controlled in the Salinas Valley and northward to San Jose. The company established nine more ranches during this period; almost all of the land was leased and then farmed by the company. The exception was at Ranch No. 11, which was partly owned and also had tenant farmers. The company control of land was probably most extensive in 1919 when it reached 54,657 acres, of which 20,023 acres were owned and 34,634 acres leased. [26]

Later Patterns

The crop declines of the 1920s, due to the blight, limited farming and leasing activities on the company ranches and some property was sold. Once beet-resistant seeds were introduced production rebounded, but by that time the sugar beet was an established crop and the company did not need to play such an active role in supplying beets for Factory No. 1. There was also competition from growers of other crops for land in the Salinas Valley. Leases were allowed to lapse and property outside of Ranch Nos. 1 and 3 was sold shortly after World War II.

Portions of Ranch No. 3 were also sold in 1940, and most of the remaining land on the ranch was sold in the late 1970s and early 1980s. Property in the Town of Spreckels and the remaining land of Ranch No. 1 surrounding the factory was sold by the mid-1980s. When Factory No. 1 closed in 1982, the company still owned 3,090 acres in the Salinas Valley and leased 12,250 acres. Today Spreckels Sugar owns only about 110 acres of land at King City and about 176 acres at Factory No. 1, which is now just a packaging facility.

Summaries of Ranches

Brief summaries of information on each of the ranches follow. Land purchase information is noted for Ranch Nos. 1-4, 6, and 11; other ranch properties were leased, so it is harder to gauge their size over time. The most definitive information available is contained in ranch summaries for the period from 1919-24, and unless otherwise noted, figures and lease information are from those sources.[27] Beet loading stations are listed for the Pajaro Valley Consolidated Railroad (PVCRR) and the Southern Pacific Railroad (SP).

Ranch No. 1

Location:	Monterey County, east side of the Salinas River southwest of Salinas at Spreckels
Loading Stations:	Agenda, Buena Vista, Tucker, Nacional (PVCRR); Spence (SP)
Drawing:	69

Claus Spreckels made the first land purchases at Ranch No. 1 in 1895, and portions of the first few tracts were devoted to the Factory No. 1 site or to the Town of Spreckels rather than the ranch. Between May 1895 and May 1897, he purchased approximately 6,888 acres near Salinas. The land was then transferred to his sons John and Adolph, who in turn transferred

the property to the Spreckels Sugar Company in late 1897.[28] From that point on the company purchased land directly, and in the period from 1903-24 it acquired another 1,054 acres for Ranch No. 1.[29] More significantly, the company began selling large parcels of property at Ranch No. 1 in the 1920s. Some small parcels had been let go over time but in 1920 almost 1,900 acres were sold.[30]

Beyond the land the company owned, it also leased property for Ranch No. 1. In 1919 approximately 6,863 acres were owned and 3,749 acres were leased for a total of 10,612 acres. By 1924, total holdings at Ranch No. 1 were down to 7,832 acres of which 4,855 acres were owned and 2,977 acres were leased.[31] The company farmed Ranch No. 1 and also leased or sublet portions to tenants.

Ranch No. 2

Location:	Monterey County, west side of the Salinas River west of Soledad
Loading Station:	Camphora (SP)
Drawing:	70

Claus Spreckels purchased 1,200 acres for this ranch in July 1897, and the property was transferred to the Spreckels Sugar Company through his sons later that year. The company-held portion of the Ranch No. 2 remained essentially the same into the 1920s.[32] A small amount of additional land, averaging perhaps 200 acres, was also under lease at various times. This ranch was entirely farmed by the company. The ranch was sold shortly after World War II.

Ranch No. 3

Location:	Monterey County, at King City
Loading Stations:	Elsa, King City, Argus (SP)
Drawings:	71, 72

The Spreckels Sugar Company purchased portions of the King Ranch from Charles H. King, the founder of King City, and his wife Kate in 1897-98. These purchases amounted to 11,906 acres and between 1910-13 the company added another 1,025 acres to the ranch.[33] The ranch lands were directly adjacent to King City, and over time the Spreckels Sugar Company subdivided some of the property into building lots which were annexed to the town. The company farmed all of Ranch No. 3, which extended over 12,347 acres in 1919, of which 11,415 acres were owned and 932 acres leased.

The first major sale of land from the ranch was a 1,250 acre parcel sold in 1917.[34] The non-irrigated portions of the ranch were sold in 1940. Two thirds of the irrigated lands were sold in 1979, and except for about 110 acres, all of the remaining acreage was sold in the mid-1980s.

Ranch No. 4

Location:	Santa Clara and San Benito counties, between Hollister and Gilroy
Loading Stations:	Luzon (SP)
Drawings:	73-78

Ranch No. 4, also known as the Soap Lake tracts, was purchased by the Spreckels Sugar Company in 1898. The original purchases totaled 9,722 acres, and a map from 1905 lists 9,658 acres as a total.[35] This latter map indicates that the ranch was divided for tenant farms into fifty-one parcels which ranged in size from 129 to 1,226 acres. The ranch property was sold in 1909. The Spreckels Sugar Company had a barn and an addition to a ranch house designed for the property by architect William Weeks, which indicates that there was a company presence on the ranch in addition to tenant farms. Weeks also designed tenant cottages and associated barns for the ranch.

Ranch No. 5

Location:	Monterey County, along south side of the Tembladera Slough south of Castroville
Loading Stations:	Vierra, Clausen, Bardin, Blanco, Dee, Cooper, Moro Cojo, Ranch (PVCRR)
Drawing:	79

In 1888 Claus Spreckels began to lease 1,000 acres of land on the Bolsa del Potrero y Moro Cojo Ranch at the north end of the Salinas Valley.[36] The property was divided and sublet to tenants who grew beets for the Western Beet Sugar Company in Watsonville. Over time, the amount of land leased increased and the leases were taken over by the Spreckels Sugar Company. In 1905, the total area of Ranch No. 5 was approximately 6,780 acres.[37] In 1919, the area leased was down to 4,417 acres; the leases expired in 1921.

Ranch No. 6

Location:	Monterey County, along the Alisal Creek east of Salinas
Drawing:	80

Ranch No. 6 at Alisal was purchased mainly for the limestone quarry on the property, and was connected to Factory No. 1 by a branch of the PVCRR. Claus Spreckels bought the first 20 acres at the quarry in 1896-97 and the land was subsequently transferred to the Spreckels Sugar Company through his sons. The company purchased an additional 568 acres adjacent to the quarry between 1901-8, which was mainly used as a cattle feed lot supplied with beet pulp from the factory.[38] About 35 acres of the ranch were sold in 1907-8 and almost all of the rest, another 531 acres, was sold in 1920.[39]

Ranch No. 7

Location:	Santa Clara County, along the Pajaro River northeast of San Juan Bautista
Loading Station:	Sargent (SP)
Drawing:	81

This growing area in Santa Clara County was first leased about 1905. The ranch covered 1,317 acres in 1919, but was down to 650 acres by 1924. Ranch No. 7 was farmed entirely by the company. The lease with the J.P. Sargent Estate Co. expired in 1924 and it appears that the Spreckels Sugar Company did not farm the property after that year.

Ranch No. 8

Location:	Monterey County, east side of the Salinas River west and north of Soledad
Loading Stations:	Rack, Camphora, Molus (SP)
Drawing:	82

Portions of Ranch No. 8 were leased by 1909, and it covered 7,282 acres in 1919. Acreage controlled by the company declined to 5,240 acres in 1924. The ranch was entirely farmed by the Spreckels Sugar Company.

Ranch No. 9

Location:	Monterey County, near junction of the Arroyo Seco and the Salinas
River	south of Soledad
Loading Station:	Harlem (SP)
Drawing:	83

This ranch was part of the Mexican land grant known as the Los Coches Rancho. It was leased, beginning in 1913, from the David Jacks Corporation, one of the other major landholders in the Salinas Valley. The ranch comprised 2,498 acres in 1924. It was entirely farmed by the company.

Ranch No. 10

Location:	Monterey County, east side of the Salinas River west and south of Chualar
Loading Stations:	Gabilan, Chualar (SP)
Drawing:	84

This ranch was part of two Mexican land grants, the Chualar Rancho and the Zanjones Rancho. The various portions of the ranch were leased from the David Jacks Corporation, beginning in 1913 and 1916. The ranch extended over 4,405 acres in 1924. It was entirely farmed by the Spreckels Sugar Company.

Ranch No. 11

Location:	Monterey County, west side of the Salinas River southeast of Greenfield
Loading Stations:	Espinosa (SP)
Drawing:	85

Ranch No. 11 was leased beginning in 1917. Interests were purchased in some of the ranch land in 1920, and by the mid-1920s the Spreckels Sugar Company owned the majority of property on the ranch.[40] Ranch No. 11 included 8,358 acres in 1924, of which 4,701 acres were owned and 3,657 acres leased. It was farmed by the company and by tenants. The ranch property was sold shortly after World War II.

Ranch No. 12

Location:	Santa Clara County, west and south of Milpitas
Loading Stations:	Milpitas (SP)
Drawing:	86

Portions of Ranch No. 12 were leased beginning in 1917, and by 1924 the ranch included 2,777 acres. It was farmed entirely by the company.

Ranch No. 13
Location: Santa Clara County, southeast of San Jose
Loading Stations: Lick, Sparrow (SP)
Drawing: 87

Two parcels totaling 228 acres were leased as Ranch No. 13 beginning in 1918. Ranch No. 14 was merged into Ranch No. 13 in 1921, and a combined area of 1,227 acres was farmed in beets that year. The following year the ranch included only 623 acres, and by 1924 it dropped out of the records. The ranch was farmed entirely by the company.

Ranch No. 14
Location: Santa Clara County, southeast of San Jose
Loading Station: Sparrow (SP)
Drawing: 88

This ranch was leased beginning in 1918, and covered 311 acres in 1919. In 1921 the property managed under Ranch No. 14 was combined into Ranch No. 13. The ranch was farmed entirely by the company.

Ranch No. 15
Location: Monterey County, northwest of Soledad
Loading Station: Rack (SP)
Drawing: 89

Ranch No. 15 was formed by the company when it leased additional land adjacent to Ranch No. 8 beginning in 1921. The ranch comprised 1,097 acres the following year. The majority of the ranch had previously been parcel No. 8 of Ranch No. 8. The ranch was entirely farmed by the company.

Spreckels Sugar Company and Sugar Beet Research

Another aspect of the company's agriculture program, complementary to the ranches and working with independent growers, has been ongoing plant research, which started in response to the beet blight. As early as 1899 serious crop losses were reported in the Salinas Valley due to blight in the sugar beets. The blight, also known as curly top, is a viral disease spread by insects called leafhoppers. By the mid-1920s the blight threatened to devastate the beet-sugar industry west of the Rocky Mountains.

The U.S. government began work on blight-resistant beets in 1908. The Spreckels Sugar Company later established an experiment station and began breeding from stock that had resisted a severe infestation in 1919 (drawings 90-92, photo 90). Plant selection was done on the company ranches, particularly Ranch No. 3 at King City. The company worked extensively through the 1920s, and in 1927 turned its findings over to the California Agricultural Experiment Station associated with the University of California at Davis. A

blight-resistant variety was developed by 1930, but it did not prove to be commercially viable.[41]

A government blight-resistant seed variety, U.S. No. 1, was released to growers in 1933 and the Spreckels Sugar Company received a small supply. Although an improvement, U.S. No. 1 had some undesirable characteristics and better varieties were later introduced, including some started by the Spreckels Sugar Company.[42] In 1941 the U.S. Department of Agriculture supplied the company with U.S. No. 22, a variety which was extremely resistant to curly top.[43]

Beyond developing blight-resistant seed stock, research on sugar beets has continued to develop other desirable characteristics which make the crop easier to grow and increase yields. The federal government still distributes new varieties of beets to company research programs where work is done to adapt them to local conditions. The Spreckels Sugar company still conducts plant research at the Factory No. 1 site.

RANCH LABOR : TENANT FARMERS AND MIGRANT WORKERS

Before Claus Spreckels brought beet sugar operations to the Pajaro and Salinas valleys, cattle ranching and grain farming were the primary economic activities in both areas. Ranching and grain production required few laborers per acre, but beet farming was relatively labor-intensive. At first Spreckels contracted for beets with surrounding farmers in the Pajaro Valley, many of whom turned to Chinese laborers to tend and harvest the crops. At Factory No. 1, Claus Spreckels and the Spreckels Sugar Company likewise contracted for beets with independent growers, who in some instances were also part of various colonization schemes. But the Company also relied on tenant farmers and migrant workers on its own ranches to ensure a steady supply of beets for the factory at Spreckels.

By far the most important component of the labor issue until the 1950s was the migrant labor pool. Tenant farming was an important activity on a few of the company's ranch properties, but in many cases those tenants, as with the other contract growers, relied on the same pool of migrant labor as the foremen on the company-farmed tracts. The colonization schemes supported by Claus Spreckels, which were off company property but provided some beets to the factory and some labor for the fields, are worth noting as social structures or experiments. These too, however, were overshadowed in importance by the labor offered through successive groups of immigrant and American-born migrant workers coming into California and the Salinas Valley.

Tenant Farming on the Spreckels Sugar Company Ranches

Tenant farming was one of the means the Spreckels Sugar Company used to ensure a steady supply of sugar beets. Individual farmers were tenants of the Company on property it owned or on property it leased from others. Some tenants were labor contractors who did not occupy or work their leaseholds themselves, but rather hired others to work the land. Some plots served only as fields, and not as the homes, to their tenants. Others served as the homes and agricultural land for families.

Tenant farming was started on leased land at the Moro Cojo Ranch near Moss Landing to supply the Western Beet Sugar Company. Under the Spreckels Sugar Company this area later became part of Ranch No. 5 and continued as tenant farms. Ranch records from around 1920, when company property holdings were probably most extensive, indicate that tenants were farming portions of Ranch No. 1, the second largest ranch, portions of Ranch No. 11 and all of Ranch No. 5.[44]

Colonization Schemes

As Factory No. 1 was under construction there were several colonization or settlement schemes underway around the Salinas Valley. One was a German colony established near Natividad, which contracted to grow sugar beets for the Spreckels Sugar Company.[45] More notable was the Salvation Army colony near Soledad known as Fort Romie.[46]

Fort Romie
In 1898 Claus Spreckels supported the formation of the Salvation Army commune called Fort Romie, located adjacent to Ranch No. 2. He donated money and helped the colonists

grow sugar beets under contract. The property was divided into ten to twenty acre lots and sold on long-term payments to unemployed and impoverished people enlisted through the Salvation Army in San Francisco. This was perhaps the first attempt in California to settle the unemployed on the land and the colony was a moderate success.[47] Many of the colonists also worked for the Spreckels Sugar Company on the ranches or for other growers.

The industrial nature of California agriculture, which depended on large land holdings, worked against subdivision schemes such as Fort Romie. The arrival of the Japanese and the flexibility of using migrant labor also served to outweigh the importance of colonization projects where people lived and worked communally or on their own small plots.

Migrant Labor

California agriculture from the 1870s into the 1920s can be characterized by at least three general trends: the movement toward and then away from a series of boom (and more labor-intensive) crops, an industrialized nature supported through large land holdings, and the use of a migrant labor pool composed of successive groups of immigrants. The operations of the Spreckels Sugar company both promoted and reflected these trends. Sugar beets represented a third wave of new bonanza crops, following wheat and fruit. As discussed earlier, land acquisition or control by the Spreckels Sugar Company began in the 1890s, and over the next couple of decades resulted in the company holding title or leases to large tracts of the Salinas Valley and elsewhere. In the area of labor for the beet growing areas, indications are that the company also used an immigrant work force similar to that of other agricultural areas in the state. Beginning in the 1920s, there was an increase in native whites in the state's migrant labor pool which lasted until after World War II, at which time sugar beet agriculture was substantially mechanized and migrant labor became much less important.

For the following discussion, migrant labor refers to workers who move from place to place following the cycles of various crops. The successive ethnic groups in the migrant labor pool will be noted as immigrants since at the time when each group was dominant most members of the work force had immigrated directly from their respective home countries. This manner of reference is carried through with the Mexicans, who started working as migrant laborers in about 1920 and were later brought in to alleviate labor shortages during World War II. Most of these workers were Mexican nationals, rather than Americans of Mexican descent or members of other latino groups which figure more prominently in the current migrant labor situation.

Immigrant Labor Groups 1870s-1920s

Beginning in the 1870s, the Chinese, as they were driven from the mines and construction work ended on the railroads, were the first group of immigrants to work extensively in agriculture. A ban on further immigration of Chinese in 1882 meant a gradual depletion of the Chinese labor pool. Since California, along with the entire Pacific Coast, was in a depression during the 1890s, the impact of the decline was not felt until the turn of the century, at which time Japanese immigrants generally replaced the Chinese as migrant laborers. The Japanese were dominant as migrant laborers into the 1910s, but many became tenant farmers or farm owners in their own right and dropped out of the labor pool.

Various European immigrant groups also arrived in California beginning in the 1890s, but most members of these groups established themselves in specialized areas of agriculture and were tenant farmers rather than becoming part of the migrant work force. During the same period as the Japanese, immigrants from India did figure into the labor situation as migrant workers, although not prominently. The next major groups to enter the work force were the Mexicans during World War I, and then the Filipinos from the 1920s into the 1930s. A brief description of each of these groups and their labor practices follows.

Chinese
Many Chinese arrived in California during the 1860s and 70s, with the mining and railroad booms. Much of this foreign labor force remained and gradually shifted into migrant agricultural work. The numbers of Chinese in California were increased with new arrivals until anti-immigrant pressure led to the passage of the Exclusion Act in 1882. The Chinese generally worked in gangs under a boss who contracted with the grower to provide labor. The contractor received a commission from each laborer hired by the grower. There was very little individual bargaining. This was the start of the labor contracting system which was used with variations by the later immigrant groups. In Northern California, individuals often found jobs on work gangs through the Chinese family associations in San Francisco, which was the most common point of entry.

During the working season the labor gangs would live in bunkhouses or shanties at the various work sites and took care of their own board. In the winter months, the laborers returned to San Francisco or other communities with Chinatowns. The Chinese were also likely to return to China after several years.

Japanese
Japanese laborers arrived directly from Japan, or through Canada and Mexico. Many others arrived in California after their labor contracts expired on sugar plantations in Hawaii. The Japanese were particularly needed after 1900 to replace the declining Chinese, and generally emigrated with the intention of staying in the United States. The Japanese also worked under the contract system, but used it as a way to rise from migrant status to tenant farmer and land owner.

To establish themselves in the labor market, the Japanese at first underbid their competitors, which were either the remaining Chinese or native white laborers. Once dominant they were able to raise labor rates. Individual workers found work in several ways under a contract system which was generally more cooperative. One was through "Japanese camps" where bosses maintained bunkhouses and provided meals, and for a fee from each man, connected workers to ranchers or growers. Another method of finding work was through "clubs," which were lodging houses that charged an annual membership fee. The club secretary would act as a contractor and solicit employers in the area, often receiving a commission from the worker when he was placed in a job. Club members could live and board at the club whenever they were out of work. Employers often also had their own Japanese bosses who would hire groups of workers directly or through negotiations with camp bosses and club secretaries.

With the profits gained by effectively using the contract system to secure higher wages, the Japanese soon became tenant farmers or land owners. The Japanese laborers who did not

have land often worked on Japanese-owned farms instead of those belonging to whites, so that by 1920 the group had diminished in importance in the migrant labor pool. Again, anti-foreigner sentiment led to the passage of the Quota Law in 1924, which virtually ended Japanese immigration, and to the enactment of state anti-alien land laws in 1913, 1920 and 1930 which restricted land ownership.

East Indians or Hindustani
Immigrants from India began arriving in California after 1900, often coming from Canada. Many became migrant agricultural workers. Their numbers were never large, especially compared to the Japanese, or the Mexicans and Filipinos who followed. The Indians also generally worked through bosses, but the bosses often just acted as spokesman for the group and did not receive any extra compensation. Further Hindu immigration was excluded under the Immigration Act of 1917.

Mexicans
As they departed from the migrant labor force, the Japanese were gradually replaced by the readily available laborers from Mexico. Mexican immigration was encouraged during World War I and private employment agencies proliferated, often recruiting directly south of the border. The labor contracting system was standard, but as was the case with the Chinese, the contractor was much more of an agent for the owner just working for a commission. The workers were expected to return to Mexico in the off-season, but in reality many stayed on in California cities.

Filipinos
The number of Mexican migrant laborers was effected both by the return of American soldiers after World War I and a subsequent rise of native-born white laborers, and by Filipinos, then American citizens, who came to work in the mainland United States in significant numbers beginning in the 1920s. As with the Japanese, the Filipinos underbid the prevailing (Mexican) wages and organized under the contract system into "clubs." The Filipino work gangs were more permanent than the Mexican of the same period, and once dominant the Filipinos were also able to demand higher wages. Filipinos also increased their value to employers by specializing in certain crops such as lettuce and artichokes which required more careful hand labor, although they also worked in the sugar beet fields. By the 1930s employers were wary of the Filipino dominance in the migrant labor pool since as citizens they could not be controlled through deportation. With drought forcing families from farms in the south-central states, growers in California had another source of labor at hand.

Migrant Labor: 1930s, World War II and Post War Trends
Although always present in the migrant work force to a certain degree, especially during the depression of the 1890s and the period after World War I into the 1920s, native-born whites came to dominate California's migrant work force in the 1930s. Dust Bowl refugees poured into the state from Oklahoma, Texas and Arkansas, desperate for work during the depths of the Depression. Due to the influx there was agitation against the Mexicans and many were forced to repatriate to Mexico. The oversupply of labor lasted until World War II when wartime shortages forced the government back into looking toward Mexico as a source of farm workers.

The United States fostered the Mexican Farm Labor Agreement in 1942. This agreement, and later legislation from 1951 and 1963, provided for migrant laborers, or "braceros," to come in from Mexico. After the war, immigration of workers from Mexico dwindled again as whites and African Americans, drawn West by wartime industries, formed the majority of the migrant laborers in California. Since that time latinos have again come to dominate the migrant work force, but as noted earlier sugar beet agriculture has become substantially mechanized.

Migrant Labor on the Spreckels Sugar Company Ranches
From his experiences in Hawaii, Claus Spreckels was familiar with the use of immigrant labor and the contractors who supplied it, particularly those from China and Japan. Spreckels employed Chinese workers to build the Pajaro Valley Railroad, and growers who supplied his Watsonville factory were dependent on Chinese labor to tend and harvest the beet crops (photo 91). With Factory No. 1 the Spreckels Sugar Company took on the added responsibility of growing beets, and available materials suggest their hiring of migrant laborers followed the general trends in California.

No company records exist of ranch workers or the arrangements for their employment, but maps and sporadic references to buildings in inventories offer clues to the groups of laborers employed over time. Most informative are a series of ranch maps produced between 1918-20, which show permanent camps that served as administrative centers and workers' quarters on the ranches (photos 89, 92). This represents a period when the migrant work force was at its most diverse and included Japanese (present but on the decline), Indians and increasing numbers of native whites, Mexicans and Filipinos.

There are a total of forty-four camps shown for Ranch Nos. 1-3 and 8-11, of which twelve are noted by names of ethnic groups. White laborers were undoubtedly housed at the headquarters camp or at camps noted by other names, and foreign workers probably were also. Three Japanese camps appear at Ranch Nos. 2, 8 and 10; three Indian or "Hindu" camps appear at Ranch Nos. 3, 8 and 10; two Mexican camps are shown at Ranch Nos. 10 and 11; Ranch No. 9 had one Filipino Camp and one China Camp (although this latter example may have been just a name); and Ranch No. 8 had one Portuguese Camp and one "Foreign Labor" Camp. Ranch summaries from 1919 also indicate that some foreign workers were housed on the other ranches farmed by the company, Nos. 7 and 12-14, but none on Ranch No. 5 which was sublet to tenants. The tenants were responsible for housing their own workers. Although numbers of workers do not appear, the ranch summary does list accommodation available at each ranch, which gives an indication of the work force. Of a total of 3,226, 1,794 "foreign" workers could be housed compared to 1,432 "whites."[48]

Available drawings of ranch buildings from around 1920 show that the camps were essentially the same for white laborers and foreign laborers. The bunkhouses had either an open plan or were subdivided into bedrooms (drawings 93-5). Some additional living quarters for foreign workers should be noted at the town of Spreckels. A series of bunkhouses, very similar to those for Ranch No. 2, were built adjacent to the depot, and more permanent houses were developed in a scheme for Mexican families just east along Spreckels Boulevard dating from 1917 (drawing 96, photo 93).

During World II, with beet production up after the introduction of blight-resistant seed, the beet growing areas ran short on labor. To compensate, the company hired Native Americans from reservations in New Mexico and Arizona, and participated in the "Bracero" program, which brought in workers from Mexico beginning in 1942.[49] The thrust was mainly to provide field laborers to growers at the harvest. Although the Bracero program continued following the war, the need for migrant laborers decreased as mechanization took hold and company-held acreage declined.

WATER AND IRRIGATION SYSTEMS

Water and irrigation systems contributed to the rapid changes in agriculture in the Salinas Valley, and many developments in irrigation were reflected in the operations of the Spreckels Sugar Company and Factory No. 1. Prior to his arrival in the Salinas Valley, Claus Spreckels already had extensive experience building water and irrigation systems in Hawaii, mainly at his Spreckelsville Plantation on Maui. Beginning in 1897, Spreckels Sugar Company engineers worked to develop reliable irrigation systems made up of canals, ditches, pipelines, river pumping stations and wells for the new Factory No. 1 and the surrounding beet growing areas (drawings 97-100, photo 94). In addition to guaranteeing that existing beet growing lands could still produce during dry years, the irrigation systems opened up previously marginal dry-farming lands for beet production. The Spreckels Sugar Company also did extensive protection work along the Salinas River at the Factory No. 1 site and other locations in response to flooding (drawings 101-3; photo 95).

Water Supply for the Factory No. 1 Site and Ranch No. 1

The first water system work done by the Spreckels Sugar Company was on the water supply for the factory itself. A series of water lines were built from a pumping station in the middle of the Salinas River south of the factory. The lines extended to both sides of the river over a utility bridge and were connected to the factory on the north, and to the Spreckels reservoir up the hill across the river from the Factory No. 1 site on the south (photo 96). Between the river and the factory were artesian wells which augmented the river water to meet the tremendous water needs of the Factory No. 1 complex. The well installation included six wells, 4' in diameter and 190' deep. The river pump and the pumps for the wells were driven off electricity generated for the factory in the Main Building.

Water from the river and wells could also be pumped to irrigate land on Ranch No. 1 when the factory was not in operation. When the campaign was in progress, the waste water from the factory was pumped into the irrigation system for the ranch.

By 1915, as the factory expanded, the supply of water from the Salinas River proved inadequate and an additional installation of wells was necessary. The factory required a further increase in supply from wells by 1919, and in 1924 the Company began drilling deeper wells with pumps. Eventually all of the older wells were abandoned and the entire water supply for the Factory No. 1 site came from new wells and deep well pumps.[50]

Early Canals, River Pumping Stations and Irrigation Wells in the Salinas Valley

Irrigation in the Salinas Valley was limited until the 1890s. Gravity irrigation, the simple diversion of water directly from the source into the fields or into canals, was used first. A second phase of development relied on pumping water from the Salinas River and after that wells became the most important source of supply (drawing 104).

There were three principal sources of surface water in the Valley: the Salinas River, the Arroyo Seco west of Soledad and the San Lorenzo Creek east of King City. A six mile long canal diverting water from the Salinas River was built in the southern part of the valley near

San Ardo in the mid-1880s. It operated into the 1890s, but was abandoned by the time a study of Valley irrigation was published in 1904.[51]

The major canals in the Valley were begun in the 1890s. The Salinas canal was started by the Salinas Valley Water Company (SVWCo.) in 1896 and ran parallel to the Salinas River on the east side near King City. Another SVWCo. canal, also started in 1896, tapped into the San Lorenzo Creek east of King City and ran into the Salinas canal. The SVWCo. Arroyo Seco canal No. 1, built in 1897, ran parallel to a section of the Arroyo Seco southwest of Soledad.[52] Another canal, the Arroyo Seco canal No. 2, was built further up the Arroyo Seco by the SVWCo. in 1898. A fourth canal was built by the Gonzales Water Company in 1899. This latter canal ran northward seven and a half miles from a diversion point on the Salinas River about four miles southwest of the town of Gonzales.

In addition to the canals a couple of major pumping stations were operating along the Salinas River just after the turn of the century on tracts not controlled by the Spreckels Sugar Company. The Salvation Army Colony on the Soledad Rancho had a station on the south side of the Salinas river, as did the Soledad Land and Water Company. These early pumping stations were steam-powered and fueled with riverbank trees.

Deep wells with pumps powered by wind, small gasoline engines or portable steam threshing engines also became widely established around the Valley during the late 1890s. The largest installation, except for Factory No. 1, was probably that of the Salinas City Water Company. The city plant was steam-driven and comprised of ten, 20" bored wells that ranged in depth from 165' to 200'.[53] Wells on farms were used for domestic water and increasingly for irrigation. Most wells were later powered by gasoline engines and then electricity.

Canals and River Pumping Stations on the Spreckels Sugar Company Ranches

Although not responsible for the earliest canals or deep wells, the Spreckels Sugar Company was at the forefront in shear capacity and in extending irrigation systems to lands in the Salinas Valley. The company first built additional river pumping stations and then turned to wells as the principal source of irrigation water for the ranches. The company also supported the construction of a canal on the Arroyo Seco to supply Ranch No. 2.

In addition to the river pumping plant and wells at the Factory No. 1 site and at Ranch No. 1, the Spreckels Sugar Company built three more river pumping stations by 1904 on Ranch Nos. 1, 2 and 3 serving some 3000 acres.[54] The pumping station on Ranch No. 3 at King City was built in 1897-98 as Factory No. 1 was under construction. The station drew water from a 100' x 25' sump pit near the river, which was excavated to a depth of 30' to capture the underground flow. Its original three centrifugal pumps were driven by three steam engines run off of eight boilers.[55]

The canal built to supply the Spreckels Sugar Company Ranch No. 2 was the Arroyo Seco canal No. 3, which diverted water from the Arroyo Seco a short distance below the SVWCo. canal No. 2. It was built in 1901-2 to irrigate some 2,000 acres of land on Ranch No. 2. The canal measured 20' across at the bottom and 38' across at the top, with a flow depth of 4'. The overall length was fourteen miles. The canal was the longest of the principal canals in

the Valley. A main canal was proposed from the Arroyo Seco down the entire length of the Valley to Monterey Bay in the early 1900s, but the system was never realized. Although noted in the 1904 irrigation survey as the "Spreckels" canal, the Arroyo Seco canal No. 3 right of way was actually acquired by the Monterey County Water Company.

Monterey County Water Company

The Monterey County Water Company (MCWCo.), which was closely associated with the Spreckels Sugar Company, was formed in 1901-2, and consolidated ownership of the Spreckels canal and several canals built by the SVWCo. (drawings 105-7). The SVWCo. Salinas and San Lorenzo canals became the MCWCo. canals "A" and "B" respectively. The Spreckels Arroyo Seco canal was the MCWCo. canal "C" and the SVWCo. Arroyo Seco canal No. 1 became the MCWCo. canal "E" (canal "D" was a proposed extension to "E" which was never built). The SVWCo. Arroyo Seco canal No. 2 and the Gonzales canal remained as separate entities.

The MCWCo. extended the "C" canal with a branch closer to the Salinas River by 1907. This branch passed through the Salvation Army colony at Ft. Romie and several other small parcels before reconnecting to the main canal and emptying waste water back into the river.

The canals varied in periods of use and effectiveness. Torrential rains during the winter were difficult to control at the headgates, and during the summer water levels were often inadequate for irrigation. The MCWCo. canal "B" was apparently out of use by 1915, and the land was conveyed to the Spreckels Sugar Company.[56] Canal "B" was still in use in the early 1920s providing water to Ranch No. 2, but this and the other canals in the Valley, with the exception of the MCWCo. canal "E," were abandoned by the late 1940s.[57]

Growth of Well Irrigation on Spreckels Ranches and in the Salinas Valley

The demand for water in the Salinas Valley steadily increased over time. Early practice in growing sugar beets on well-suited land dictated only one irrigation of the field before planting. Other lands, however, required more applications of water, and in the 1930s it was found that maintaining constant growing conditions, including the amount of moisture in the ground, increased sugar content in the beets. In addition, the crops rotated in with the beets and the vegetable crops new to the area needed varying, but generally higher levels of irrigation. The river pumping plant at Ranch No. 3 near King City was augmented with six wells, 20" in diameter and 70' deep in 1904, and certainly the irrigation practices of Spreckels Sugar Company pointed the way for other sectors of agriculture (photo 97).

The canals and river pumping stations declined in use as well irrigation was developed to meet the demand for water throughout the Valley beginning in about 1910. Beyond the problems inherent in using seasonally variable surface run-off for irrigation, three other factors served to encourage the use of wells. These were the extension of electric power to King City beginning in 1911, the perfection of efficient deep well pumps which could be operated with minimum care, and the introduction of wide-scale lettuce and vegetable growing in the mid-1920s (photo 98).[58]

Information on Spreckels Sugar Company ranches from around 1920, the period when Company land holdings through ownership and leases in the Salinas and Pajaro valleys were probably at their height, indicates the predominance of well irrigation over the earlier river pumping stations. Ranch Nos. 1-3, 5 and 7-11 had a total of twenty-four pumping plants, which included those pumping from wells. Of those between three and five were permanent installations taking water directly from the Salinas River, another six were portable pumping plants used on the Salinas and Pajaro Rivers and the remaining thirteen to fifteen plants were grouped well installations.[59]

Sugar beet production, and therefore the company's need for irrigation infrastructure, declined throughout the 1920s due to blight. Although production rebounded in the 1930s, the sugar beet was never again the dominant crop it had been to the Salinas Valley. Over time beet acreage declined due to competition with other crops, especially lettuce. Well irrigation, utilizing individual wells and electric pumps rather than grouped wells at large pumping stations, increased along with the expansion of the vegetable industry so that by the late 1940s little first-class land remained undeveloped. With additional demand for irrigation and the encroachment of sea water into the aquifer, overpumping and the related consequences for water quality have been constant issues.

PAJARO VALLEY CONSOLIDATED RAILROAD

Although the Pajaro Valley Consolidated Railroad Company has been defunct for more than 50 years, it is important for understanding the development of the Factory No. 1 site. In the late nineteenth century, railroads were the only form of mechanized transport capable of moving massive quantities of sugar beets, coal and limestone to the factory complex, and hundreds of tons of sugar a day to market. The Pajaro Valley Consolidated Railroad (PVCRR) performed these functions and made development of the Factory No. 1 site possible (drawing 108).

The company began as the Pajaro Valley Railroad, an outgrowth of the Western Sugar Beet Company operations in Watsonville (drawing 109). To supply the demand for sugar beets, new acreage was acquired for planting in the Bolsa Nueva y Moro Cojo Rancho southwest of Castroville; efficient transportation of the beet harvest from field to factory became essential. Another reason Claus Spreckels built his own railroad was his reluctance to ship goods on the established Southern Pacific Railway because of the tariffs it had charged him for shipping raw sugar to his refinery in San Francisco.

The narrow gauge track, based on rails spaced three feet apart, proved flexible in the fields. It was easy to build, and extensions could easily be constructed to bring the small rail cars loaded with beets, pushed by laborers or pulled by horses, to points along the main line where they could then be hitched to a locomotive (photo 99). With the influx of agricultural workers, many labor camps were also needed to provide housing. The flexibility of the narrow gauge system allowed branch lines to be readily constructed between the labor camps, fields and factory.

The first 9.8 miles of track was laid south from Watsonville across the Pajaro River to Moss Landing, and then another 2.6 miles was built southwest to the Moro Cojo station (drawings 110-12). The original surveys for the rail lines were made by Thomas Wright with the assistance of Charles Pioda, then a local high school draftsman.

Mainline "A" was completed and ready for use in the 1891 beet harvest. At Moss Landing, a rail spur was built across the Salinas River to a wharf of the Pacific Coast Steamship Company. Narrow gauge tracks to the wharves at Moss Landing gave Claus Spreckels and the Pajaro and Salinas valley farmers access to national and international shipping. The mainline was extended from the Moro Cojo Ranch another 23.6 miles south to Tucker station near Salinas in 1891.

Pajaro Valley Extension Railroad

In 1897, the Spreckels interests built another 8.7 miles of track to the new factory site south of Salinas. This line was built under the corporate name of the Pajaro Valley Extension Railroad. It included 3.6 miles of track from the factory site to the Tucker station, and another 5.1 miles along Alisal Creek to Hartnell. The Alisal branch linked both the Watsonville and Spreckels factories to a limestone quarry east of Salinas. In December 1897, the two railroad companies were combined into the Pajaro Valley Consolidated Railroad Company (PVCRR). The portion of track from Tucker to Spreckels was part of the Mainline, while the Alisal branch was known as Branch Line "B."

Salinas Railway Company

In 1897, since there still was no rail system between downtown Salinas and Spreckels, several prominent citizens organized the Salinas Railway Company. They purchased a Baldwin locomotive with three day-coaches and a combination car. These had formerly operated in San Francisco on California Street from Masonic Avenue to Land's End, the Cliff House and Sutro Baths. The Salinas Railway soon became insolvent and was abandoned in 1900. Claus Spreckels, seeing the need to bring employees and freight between the two cities, built a narrow gauge link along this roadbed between Spreckels and Salinas in 1908.

Buena Vista Line

The final addition to the PVCRR was a six-mile extension, Branch Line "C," which ran from Factory No. 1 and the Town of Spreckels across the Salinas River and southeast to Buena Vista and was built in 1905. This line served the huge beet fields of the Llano de Buena Vista Rancho and the limestone quarry there. This completed the PVCRR system at 42.2-miles (drawings 113, 114).

Spreckels Bridge

The Spreckels Bridge was on the "C" branch, or Buena Vista Line as it crossed the river at the south edge of the Factory No. 1 site (drawings 115-18). The 160-foot span was supported on seven piers; one pier supported the first centrifugal water pump for the factory. The bridge carried both narrow and broad gauge track, along with the main water pipes to the factory. Two sections, one at each end, were destroyed in the 1911 flood, and the entire bridge was destroyed by flood in 1914. It was reconstructed by the Merry Elwell Company of Oakland, but shortly thereafter in 1915, the bridge had a structural failure and collapsed under the weight of a train (photo 100). The replacement bridge, an all-steel structure, was realigned at a different location and supported on concrete piers. The bridge became obsolete about 1920 when most train operations ceased. The bridge continued to carry water pipes from the reservoir to the Factory No. 1 complex and the Town of Spreckels. Most of the bridge had collapsed before the final span was dismantled in December 1971.

Railroad Equipment

The PVCRR operated a variety of locomotives, service cars, freight cars and passenger coaches (drawings 119-23). Most common were the gondola cars, mainly used for hauling beets (photo 101). Some of the railroad's rolling stock and equipment were designed by the company for its own use.

Dissolution

With the advent of trucks for shipping and automobiles and buses for passenger transportation, the increase in use of the faster rail lines of the Southern Pacific and the decrease in shipping at Moss Landing, the PVCRR became obsolete by the late 1910s. The 1928 beet campaign was the last harvest that used the railway. The Southern Pacific bought the PVCRR in December 1929, including the rights-of-way and tracks, rolling stock and buildings; it idled the locomotives in 1930 and sold them for scrap in 1935.

Important Railroad Dates

1890	Incorporation of Pajaro Valley Railroad.
1891	Extension of Mainline from Moro Cojo station to Tucker station near Salinas
1897	Pajaro Valley Extension Railroad built to Spreckels. Branch to Alisal quarry built (Branch Line "B"). Incorporation of Pajaro Valley Consolidated Railroad. 50% of PVCRR stock is sold to American Sugar Refining Company.
1905	Buena Vista Branch "C" built.
1908	Extension to Salinas built.
1911	Flood destroyed north section of Spreckels Bridge, rebuilt.
1914	South portion of Spreckels Bridge destroyed by flood, rebuilt. South span of Spreckels Bridge destroyed in train accident, rebuilt.
1920	First track abandonment on Line "B."
1929	PVCRR ceased operations.
1930	PVCRR sold to Southern Pacific Co. Narrow-gauge tracks in the Factory No. 1 yard taken up. Beet Bins converted to broad-gauge. Two narrow-gauge engines exchanged for two broad-gauge locomotives.

THE TOWN OF SPRECKELS

The Town of Spreckels, just to the north across Spreckels Boulevard from the Factory No. 1 site, was planned, financed, built and for many years controlled by the Spreckels Sugar Company (photo 102). It came into being solely as part of the infrastructure the company built to support the Factory No. 1 complex. But as in the case of many company towns, the town took on a life of its own and has outlived the operation which launched it (drawings 124-26).

At the time the Town of Spreckels was established, company towns in general were still considered examples of good residential planning. The forerunner of this concept was Pullman, Illinois. It was considered the "ideal town" until the 1893 depression created labor tensions that ended in riots. After that, company towns were often considered symbolic of oppressive control. Although much smaller than Pullman, the Town of Spreckels provided similar benefits to both the residents and the company: affordable, clean and safe housing that stabilized a local labor force.

The site of the future Town of Spreckels was surveyed by Charles Pioda in 1897. The first building was a residential hotel built for single male workers. Individual houses were soon built for married workers with families. Houses built by the company in Spreckels were generally cottages or bungalows, set back from the street with a front garden and entry porch (drawings 127-30; photo 103, 104). Although house sizes varied, there does not appear to have been a strict hierarchy of housing types in the town relative to positions at the factory. Much of the housing stock has been significantly altered since it was constructed.

Spreckels grew and prospered until the beet blight began to take an economic toll. By 1925 the huge economic loss to the area forced many workers to leave. Eventually the blight caused almost every business in the town to close. With the development of disease-resistant beet strains in the mid-1930s the town began to grow again (photo 105).

The town is based on a grid with ten principal blocks and a longer narrow block along the railroad tracks which form the town' s eastern edge. Spreckels Boulevard forms the south edge of the town, and on the north and west are fields. To the west Spreckels Boulevard is distinguished by parallel rows of Walnut trees which link the town to the Factory No. 1 site and continue toward the Salinas-Monterey Highway (photo 106).

The town extends five blocks north from Spreckels Blvd. and is generally two blocks wide in the east-west direction. The eastern five blocks were laid out in 1897 and the western section followed in 1906-07. Only a few buildings were ever built on another five blocks planned further west. The principal blocks are lettered A-J, and the block along the Railroad is block X. Beyond the railroad tracks to the east were bunkhouses for laborers and a housing area for Mexican families.

The north-south streets are Railroad Ave., Hatton Ave. and Llano Ave. Going north from Spreckels Boulevard the streets are numbered First through Fifth. The small commercial district was centered on block A, along Spreckels Blvd. between Hatton and Railroad aves., and the PVCRR depot was at the intersection of Spreckels Blvd. and Railroad Ave. (photo

107). The Spreckels Park occupies all of block H and is the focus for the residential blocks of the town.

Building Survey

Following is a partial list of significant buildings in the town. Some are existing ,while others were researched through historic records and photographs.

Spreckels Hotel, 1897
Block A, lots 6-15.
Photo 108.
Drawing 131.
The hotel accommodated single working men at the factory. It was a three-story, wood-frame building with sixty rooms, four private bathrooms, a bar, barber shop and dining room. At least four annexes were added at various times. Demolished 1940.

Hotel Annex No. 1 (No. 123), 1907
Block A, lots 8-9.
Annex No. 1 comprised 35 rooms. It was wood-frame, two and a half stories in height and measured approximately 76' x 24'-6". Demolished.

Lodging House - Hotel Annex No. 2 (No. 155), 1908
Block A, lots 6, 7, 14 & 15.
Annex No. 2 was wood-frame, measured approximately 107' x 50' and was two and a half stories in height. The building was board and batten with a shingle roof and brick chimneys. In 1918 four additions were built onto the Annex, and another two were added in 1920. Demolished.

Hotel Annex No. 3 (No. 254), 1917
Block X, lot 2.
Annex No. 3 was built across Railroad Ave. from the main hotel building. It measured 68' x 26', and was one story in height with two rooms. It was also referred to as the Mexican dining room and cook house. Demolished.

The Store, 1898
Block A, lot 1.
Photo 109.
The Store, located at 40 Spreckels Boulevard, is a two-story, brick building. The store was first leased to the Ford & Sanborn chain. It was divided in half between dry goods and groceries, and the north end at one time contained a bank and then the post office. The second floor was a social hall. Today the store is the Spreckels Emporium.

Firehall - Hose Company No. 1 (No. 212)
Block A, lot 2.
Photos 110, 111.
Located at 38 Spreckels Boulevard, the building measures 120' x 30' and is also known as the Spreckels Volunteer Fire Department. According to an appraisal from 1920 the building was built in 1901. In 1912 the Louvre Restaurant and Saloon in the building closed, and the

structure was remodeled into the Firehall. Popular events at the building were the Firemen's Ball and hose cart races. In 1972 a new station was constructed on an adjacent lot. The Firehall is now a recreation and meeting hall.

Spreckels School, 1899
Block E, lots 1-8.
Photo 112.
Designed by architect William H. Weeks, the original school was a two-story red brick structure over a full basement, complete with forced air heating and an imposing four-story Romanesque entry tower at the center. Demolished 1936. The school bell is now at the University of California, Davis.

Spreckels School, 1937-8
Block E.
Photo 113.
In 1948 it had eight classrooms, ten teachers and 330 pupils. Today the school district comprises 550 students.

Spreckels Park
Block H.
Photo 114.
The Park is believed to have been laid out when the second half of the town was surveyed and mapped in 1906. In 1912 plantings were added from the Leonard Coates nursery in Morgan Hill. The park and the trees in it are listed on the Monterey County Historic Register. In March 1966 the Spreckels Company gave the one-block-square park to the Spreckels Memorial District. Reconstruction began in 1967 and the park was dedicated in 1970.

Veterans Memorial Building , 1956
Block F.
Photo 115.
The Veterans Building, also part of the Memorial District, opened in 1956 at Fifth St. and Llano Ave. Architects for the building were Butner, Holm and Waterman. The site, purchased for $7,500 in 1953 from the Spreckels Sugar Company, once contained thirty quonset huts built as temporary workers' housing during World War II. Many social, service and private groups in the area use the building for meetings and events.

[26]Spreckels Sugar Company, Inc., *Recapitulation of Ranch Properties, 1919, 1922 & 1924,* (Spreckels, California: Spreckels Sugar Company, Inc., 1924).
[27]Ibid.
[28]Monterey County Deeds (Vol./Page): 45/476, 48/134, 48/163, 49/100, 49/144, 48/180, 49/174, 49/438, 51/208, 50/13, 50/239, 50/228, 50/449, 51/147, 51/419, 51/421, 52/47, 52/178, 54/1. Deed information provided by Spreckels Sugar Company.
[29]Monterey County Deeds (Vol./Page): 72/73, 76/76, 90/16, 88/498, 116/231, 122/269, 71/328, 176/411, 39/349. Deed information provided by Spreckels Sugar Company.
[30]Monterey County Deeds (Vol./Page): 177/98, 177/112, 177/109, 177/118. Deed information provided by Spreckels Sugar Company.
[31]Spreckels Sugar Company, Inc., *Recapitulation of Ranch Properties, 1919, 1922 & 1924,*.
[32]Monterey County Deeds (Vol./Page): 52/150, 52/318, 54/1. Deed information provided by Spreckels Sugar Company.
[33]Monterey County Deeds (Vol./Page): 54/94, 55/288, 115/335, 131/398. Deed information provided by Spreckels Sugar Company.
[34]Monterey County Deeds (Vol./Page): 152/62. Deed information provided by Spreckels Sugar Company.
[35]Map of Ranch No. 4, May 1905.
[36]William Orville Jones, "The Salinas Valley: Its Agricultural Development 1920-1940," Ph.D. diss. University of California, Davis, 185.
[37]Map of Ranch No. 5 of the Spreckels Sugar Co., April 1905.
[38]Monterey County Deeds (Vol/Page): 49/409, 51,432, 52/178, 54/1, 66/210, 66/205, 100/74, 100/140. Deed information provided by Spreckels Sugar Company.
[39]Monterey Couty Deeds (Vol./Page): 101/94, 103/89, 176/160.
[40]Monterey County Deeds (Vol./Page): 173/182, 172/162, 172/182. Deed information provided by Spreckels Sugar Company.
[41]Jones, "The Salinas Valley: Its Agricultural Development 1920-1940," 213.
[42]Ibid.
[43]*Honey Dew News*, Mar./April 1951.
[44]Spreckels Sugar Company, Inc.,*Recapitulation of Ranch Properties, 1919, 1922 & 1924,*.
[45]*Salinas Index* (Weekly), Sept. 9, 1897.
[46]For the establishment of the colony see *Salinas Index* (Weekly) Sept. 2, 1897 and Oct. 14, 1897.
[47]Carey McWilliams, *Factories in the Field* (Boston: Little, Brown & Co., 1939), 94-5.
[48]Spreckels Sugar Company, Inc., *Recapitulation of Ranch Properties, 1919, 1922 & 1924,*.
[49]*Honey Dew News*, Oct. 1942, Dec. 1943 and Dec. 1945.
[50]"Pioda Recalls How Water and Irrigation Transformed Pioneer Salinas Desert," *Salinas Californian*, California Rodeo Edition, June 1947.
[51]Homer Hamlin, *Water Resources of the Salinas Valley, California* (Washington, D.C.: United States Geological Survey, Department of the Interior, 1904), 80.
[52]"Irrigation, Enterprises Under Way at King City and the Arroyo Seco," *Salinas Index (Weekly)*, March 24, 1898.
[53]Hamlin, *Water Resources of the Salinas Valley, California* , 21-33, 82.
[54]Ibid, 80-1.

55"Irrigation, Enterprises Under Way at King City and the Arroyo Seco," *Salinas Index (Weekly)*, March 24, 1898.
56Map Showing Monterey County Water Co.'s Canal "B" to be Conveyed to the Spreckels Sugar Company, Aug. 23, 1915. Canal "B" was on Ranch No. 3 and ranch summaries from 1919 indicate that the irrigation for that ranch was provided entirely by water pumped from wells.
57"Pioda Recalls How Water and Irrigation Transformed Pioneer Salinas Desert," *Salinas Californian* .
58Ibid.
59Spreckels Sugar Company, Inc., *Recapitulation of Ranch Properties, 1919, 1922 & 1924.*

V. CONTEXT WITHIN INDUSTRY AND REGION

The Factory No. 1 complex, the world's largest beet-sugar factory when built and the country's largest for over sixty years, was prominent in the early development of the beet-sugar industry in California and the United States. In addition, since it was built by Claus Spreckels, the factory was part of the broader history of the entire Western sugar industry.

THE SUGAR BEET INDUSTRY

During the sixteenth century the sugar beet was widely used for medicinal tonics. It is believed to have originated in Sicily, although reference has been made to its use in the third century B.C. at the time of Hippocrates. In 1747, a German chemist, Andreas Marggraf, investigated sugar beets for their sugar content and found that sugar from beets was identical to that produced from sugar cane.

The first beet-sugar factory was financed by King Frederick William of Prussia in 1801. Production of beet sugar, however, did not establish itself as a major European industry until Napoleon set aside thousands of acres for cultivation of beets. By 1812, France had forty beet-sugar factories. Besides France, Germany, Russia, Italy, Belgium, Sweden and Great Britain also had beet-sugar industries. By 1900 two thirds of the world's supply of sugar was extracted from sugar beets.[60]

Sugar Beet Factories in the United States

The first American beet-sugar factory was built in 1838 at Northampton, Massachusetts. Although successful at producing sugar it was not a financial success and soon closed. Several other attempts were made to produce sugar in Utah, Illinois, Wisconsin and California during the 1850s and 1860s, but none proved profitable. The first truly successful operation was established at Alvarado, California between 1870 and 1874, and although it and several other factories built in the 1870s closed, the Alvarado factory was re-equipped in 1879 and operated until 1967. Spreckels' Watsonville plant, opened in 1888, was the second successful factory and over the next few years factories opened in Chino, California and the states of Utah, Nebraska and Virginia.

Despite the continued success of the Watsonville and Alvarado factories, beet-sugar production did not expand significantly in the United States until import tariffs on sugar were increased in 1897. These primarily affected the European beet-sugar producers. In 1897 over 1,000,000 tons of beet sugar were shipped from the European sugar industry to the United States; the following year the figure was less than 120,000 tons.[61]

Three new factories opened in 1897, another seven in 1898 and fourteen more the following year including the Spreckels Sugar Company factory at Spreckels, then the world's largest. The industry enjoyed steady growth over the next decade, although it was affected by the end of the Spanish-American War which brought the sugar-producing areas of Puerto Rico, Cuba and the Philippines under American influence with preferential treatment. By 1900 there were a total of thirty-five factories in the United States and in 1907 there were sixty-seven.[62] Factory construction slowed prior to World War I and the industry suffered a

major setback with tariff reductions under the Underwood-Simmons Bill in 1913. The bill also proposed the elimination of tariffs in 1916, but that clause was repealed to stimulate domestic production in response to the interruption of international shipping and the drop in European sugar exports caused by World War I.

A surge in factory construction ensued with a total of 106 factories in place by 1920. The majority of factories were in four states in the West and Pacific Northwest: Utah (19), Colorado (18), California (13) and Idaho (9). Colorado was highest in production capability, measured in slicing capacity per day, followed by California. Although Utah had the most factories, the production capacity of each was on average fairly low. In contrast, California factories had the highest average production capacity. The Spreckels, California factory, with a daily slicing capacity of 4,500 tons, remained by far the country's largest and accounted for a quarter of California's production capability. Its closest rival was a factory at Oxnard in the southern part of the state rated at 3,000 tons per day.[63]

Sugar prices reached a peak in the early 1920s and subsequently declined. Tariff controls proved ineffective in supporting the domestic industry, so in 1935 Congress established a system of production quotas and market controls for both domestic and foreign sugar. These were revised in 1937 under the Sugar Act, which served to stabilize the industry. A total of sixty-three factories were operating in 1961, by which time California had overtaken Colorado in production capacity.[64] Rated at 6,500 tons, the Factory No. 1 complex accounted for over twenty percent of California's total capacity, and was still the country's largest beet processing facility.[65] Following revisions to the Sugar Act in 1962, seven new factories were built across the country by 1968.

The Sugar Act expired in 1974, but after several years of erratic sugar prices which affected both producers and consumers, Congress again included a sugar program under the 1985 Farm Bill. The current program, which extends until 1995, is a self-supporting loan and price support program for processors who contract with growers for beets. The program also includes import quotas that are intended to protect American sugar producers while ensuring an adequate supply of raw cane sugar for refineries in the United States. Imports account for approximately fifteen to twenty-five percent of the domestic sugar supply.

Today over one half of all the sugar produced in the United States is extracted from beets. Sugar beets are grown in fourteen states, and while acreage devoted to beets has remained relatively constant since the early 1960s yields have slowly increased. California consistently ranks as one of the top five producers. While the acreage has remained constant the number of factories has dropped significantly. Approximately thirty-six factories are now in operation in the United States including eight in California. Three of the latter are operated by the Spreckels Sugar Company.[66]

CLAUS SPRECKELS AND THE WESTERN U.S. SUGAR INDUSTRY

Before he began producing beet sugar commercially in the late 1880s, Claus Spreckels had a long history of involvement in sugar refining and had already claimed the title of "Sugar King." A classic representative of capitalist enterprise, he was a poor immigrant who eventually became a tycoon and significantly affected the economic history of the Western United States through his development of the sugar industry and transportation networks.

Claus Spreckels (1828-1908) came to the United States from Germany in 1846 at the age of eighteen. He began his career as a grocery clerk in Charleston, South Carolina, and owned grocery stores there and in New York City. He came to San Francisco in 1856, and after having a grocery business and a brewery, organized the Bay Sugar Refinery with several other investors in 1863. Spreckels went back to New York and studied the refining business by working in a refinery. He then purchased equipment from a bankrupt company and shipped it to California. The Bay Sugar Refinery opened in 1864.

Sugar Refineries in San Francisco and the Bay Area

San Francisco steadily grew to become a center of the sugar industry in the West. Prior to beet sugar that meant cane sugar refining. There were four major sugar refineries in San Francisco, two of which were started by Claus Spreckels, and another in the nearby town of Crockett.

The largest sugar refinery in the city, until its closing in 1871, was the **San Francisco-Pacific Sugar Refinery** located at 8th and Harrison streets. It had been formed when the San Francisco Refinery bought the smaller Pacific Refinery in the 1850s. Another early refinery, called the **Golden Gate Refinery**, was established in 1865 at Polk and Grove Streets, the site of the future Civic Center.

Claus Spreckels began the **Bay Sugar Refinery,** located at Union and Battery streets, with other partners in 1863. By 1866, however, Spreckels had sold his share in the company. In the 1880s this refinery became the **American Sugar Refinery**, and was in business until 1891.

In 1865 Spreckels spent eight months in Germany working in a beet sugar factory, but on his return again went into the cane refining business. He organized the **California Sugar Refinery Company** at Eighth and Brannan streets in 1866, and built a new refinery at the foot of Potrero Hill at 23d Street in 1881 (photo 116). In 1891, after Spreckels merged his interests with the sugar trust (discussed on p. 99), the name changed to the **Western Sugar Refinery.** Although most sugar beet factories produced finished sugar, raw sugar from both Watsonville and Factory No. 1 was sent to the Western Sugar Refinery for final processing until 1905. The refinery, which marketed sugar under the Sea Island brand name, closed in 1948 (photo 117). The California and Hawaiian Sugar Refining Corporation, C & H Sugar, bought the plant and refined some sugar there in 1949, but the refinery again closed and was torn down in 1951.

The **California and Hawaiian Sugar Refining Corporation**, C & H Sugar, had their main refinery at Crockett a short distance northeast of San Francisco where the Sacramento River

enters the Bay. This refinery was established in 1898 and today is the only mainland U.S. refinery west of the Texas Gulf Coast.

Claus Spreckels in Hawaii

Traditionally the United States received raw cane sugar from Cuba, Puerto Rico, the West Indies, the Philippines, and Brazil. There was also some domestic production in Louisiana. In the 1850s when the Gold Rush brought rapid economic growth to the West Coast, sugar producers and refiners began to look at Hawaii as a new source. Americans also began investing in Hawaiian sugar plantations. When Spreckels began the California Sugar Refinery he imported raw sugar from the Philippines and Indonesia, but gradually he began to import raw sugar from the Hawaiian Islands. In 1876 the U.S. and Hawaii entered into a reciprocal trade agreement (the Reciprocity Treaty) which gave Hawaii a privileged position that included duty-free commerce in sugar.

Immediately after the treaty was signed, Claus Spreckels signed contracts for the purchase of half of the Hawaiian sugar crop and soon began to lease land to grow his own sugar cane. In 1880 he purchased Princess Ruth Keelikolani's interest in the crown lands of Hawaii for $10,000. In 1882, in order to buy back and settle Spreckels' claim to the Princess' portion of the crown lands, the government of Hawaii gave Spreckels title to approximately 24,000 acres of land on Maui that he was already leasing.

Spreckels organized his planting operations in Hawaii under the Hawaiian Sugar and Commercial Company and the company's Maui estate became one of the largest sugar plantations in the world. He bought additional land and leased still more. Spreckels introduced irrigation to the plantations and at the Spreckelsville plantation on Maui, in addition to converting the dry plains to sugar cane production, he built an electrical system, several large mills and railroad lines, often using Risdon Iron Works for the construction.

Over the next few years Spreckels, in partnership with sugar agent William G. Irwin, was powerful enough to purchase and gain control of about half of the cane sugar production of the islands. He financed the Hawaiian sugar cane crop and shipped the raw sugar on his Oceanic Steamship Line to the California Sugar Refinery he owned in San Francisco.[67] Spreckels exerted considerable influence in Hawaiian affairs, both through his business dealings and by his alliance with King Kalakaua, and his power was enhanced by the fact that he loaned money to the king and the kingdom.

In 1886 Spreckels had a dispute with the king and the Hawaiian government. With his political influence waning, he departed Hawaii for California. He left his investments under the Hawaiian Sugar and Commercial Company to the care of his sons John and Adolph. Claus Spreckels gave up his Hawaiian holdings in 1894 to settle a lawsuit brought against him, John, Adolph and the company by another son, C.A. (Gus) Spreckels. Although Claus Spreckels no longer had property in Hawaii, he did maintain control of cane-sugar refining in the West, especially after he came to terms with the sugar trust.

The Sugar Trust and the Western Sugar Refining Company

Hawaiian growers had made sporadic attempts to circumvent Spreckels' control of sugar refining. In 1885, with the contracts between the cane growers and Spreckels' California Sugar Refinery about to expire, some Hawaiian growers began to look for other refineries to buy their sugar. The growers made contracts with the Bay Sugar Refinery in San Francisco, ironically Claus Spreckels' first refining venture in the city. Shortly thereafter Bay Sugar came under the control of the "sugar trust" headed by Henry O. Havemeyer and the trust parent company, the American Sugar Refining Company. Havemeyer was Spreckels' main competitor in the sugar trade, and among other refineries he controlled the largest cane-sugar refinery in the world located in Brooklyn, NY.

Bay Sugar was renamed the American Sugar Refinery. Along with the refinery purchase, Havemeyer agreed to buy Hawaiian sugar from the growers unfriendly toward Spreckels and ship the crop in non-Spreckels-owned vessels. With their financial power and additional refining capacity in the East, the trust tried to undercut Spreckels in the West by selling sugar below cost.

In response Spreckels began to compete with the trust in their own territory, and was helped in California by the courts. He started the Philadelphia Refinery in 1889 and sold cut-rate sugar in markets that had been closed to him on the East Coast. A bitter price war ensued between 1889 and 1891. At the same time ,the trust's American Sugar Refinery in San Francisco was the subject of an anti-trust lawsuit brought by the State of California in 1888. The refinery was allowed to reopen in 1890, but in the meantime Spreckels had cut into their business on the West Coast.

In 1891, Havemeyer approached Spreckels and proposed dividing the sugar market and ending the competition. Spreckels agreed to a company merger in the West and his own withdrawal from the East. The trust's American Sugar Refinery was merged with the California Sugar Refinery Company to form the Western Sugar Refining Company. Spreckels maintained a controlling interest in the new company, and the American Sugar Refinery operation was closed. In return for the market control he gained in the West, Spreckels sold a controlling interest in his Philadelphia refinery to the trust. With this arrangement Claus Spreckels and the Western Sugar Refining Company maintained a virtual monopoly of the entire Western sugar market.

Claus Spreckels and the Sugar Beet Industry

When he returned to California in 1886, Spreckels was almost entirely dependent on Hawaii for raw sugar. Yet he faced the loss of his political influence in the kingdom, possible hostility toward his economic interests from the Hawaiian government, and growers who were becoming restive under his control.[68] Partly in response to these concerns, he turned his attention to something that had interested him since his stint in a German factory in 1865: the possibility of developing a beet-sugar industry in California. In 1887 Spreckels again went to Germany, which then led the world in sugar production technology, and researched the production of sugar from sugar beets. He returned to California with sugar beet seed and a plan to build a factory somewhere in California. In 1888 he incorporated the

Western Beet Sugar Company and built a factory at Watsonville in the Pajaro Valley (photo 118).

In preparation for this venture, Spreckels obtained pledges from farmers in the Pajaro Valley to grow 7,500 acres of sugar beets. In addition, the town of Watsonville raised the money to purchase the factory site, and with great ceremony Claus Spreckels was given the title to the land. With the farmers and community involved in this investment, Spreckels was assured of a steady supply of sugar beets for his factory. The venture was successful, and the Watsonville Factory was eventually expanded from its original 300 ton per day capacity to about 1000 tons per day. Spreckels had another source of supply for raw sugar.

Spreckels Sugar Company

Factory No. 1 at Spreckels was the first to operate under the Spreckels Sugar Company name. It was built to process beets from both the Salinas and Pajaro valleys, thus supplanting the Watsonville factory which was closed in 1899. The American Sugar Refining Company was a fifty percent owner of Spreckels Sugar Company from the start. The other half was controlled by Claus Spreckels and his successors, who also owned part of the Western Sugar Refinery. Spreckels Sugar and the Western Refinery maintained close cooperation until the latter firm closed in the late 1940s, with many functions such as marketing and accounting performed by the same staff.

Spreckels Sugar built additional factories in California at Manteca (1917), Woodland (1937) and Mendota (1963), and at Chandler, Arizona (1967). Factory construction generally followed upturns in the industry: during World War I, after implementation of the Sugar Act in 1934-7, and after revisions to the Sugar Act in 1962. The Chandler facility was closed in 1982. All of the remaining factories co-process, processing cane as well as beet sugar.

In 1950 the American Sugar Refining Company bought a controlling interest in the Spreckels Sugar Company and in 1963 the firms were merged to form the American Sugar Company. In 1970 the name was changed to Amstar Corporation, of which the Spreckels Sugar Division was the beet sugar producing unit. In 1984 Amstar was acquired by the holding company KKR. This latter firm sold Amstar to Merrill Lynch in 1986, and the Spreckels Division was again incorporated as a separate entity under the name Spreckels Sugar Company, Inc. In 1987 the senior management of Spreckels purchased the firm in a leveraged buyout.

Spreckels Family Members

Claus Spreckels had four sons and one daughter who survived to adulthood. Of his children, only two of his sons, John D. and Adolph B., were directly involved with the California sugar operations related to Factory No. 1. Brief biographies follow:

John Diedrich Spreckels (1853-1926)
John D. Spreckels was born in Charleston, South Carolina, but spent his childhood in San Francisco. He attended public schools and Oakland College before going to Germany to study at the Polytechnic College in Hanover. He returned to San Francisco in 1872 and went to work in his father's refinery. At twenty-two John was named plant superintendent and

the following year he became involved in the Hawaiian operations, helping to develop his father's plantation.

In 1880 he founded J. D. Spreckels & Brothers Company, a shipping and commission merchant business that operated a fleet of ships between San Francisco and Hawaii. His main business partner was his brother Adolph, with whom he later operated the Oceanic steamship line to Hawaii, Australia and New Zealand. They maintained offices in San Francisco at 2 Pine Street.

John continued to work with his father as Claus Spreckels developed his beet-sugar enterprises in California. He served as president of the Western Sugar Refining Company, the Spreckels Sugar Company, the Oceanic Steamship Company and the Pajaro Valley Railroad, among his other ventures.

After 1887 John was largely based in San Diego, where he eventually owned two of the three newspapers, the *San Diego Union* and the *Evening Tribune*, several downtown commercial buildings, a bank, the San Diego Electric Railway Company and the San Diego & Coronado ferry. He financed the completion of the Hotel Del Coronado and eventually acquired control of the Coronado Beach Company. One of his later projects was the completion of the San Diego & Arizona Railway, which linked the port of San Diego to the Imperial Valley and the east.

Adolph Bernard Spreckels (1857-1924)
Adolph B. Spreckels was born in San Francisco and remained a life-long resident of the city. He attended schools in San Francisco and Hanover, Germany before entering Heald's Business College in San Francisco. In 1876 he went to work for his father at the California Sugar Refinery and in 1880 became the company secretary.

After going into partnership with his brother John, Adolph became vice-president of the J. D. Spreckels & Brothers Company. He was also vice-president of the Western Sugar Refining Company and the Oceanic Steamship Company, and served as an officer or director in many other businesses.

Adolph was a civic leader in San Francisco, serving many years on the park commission as Golden Gate Park was improved.

[60]"The Beet Sugar Industry," *Scientific American* 82 (March 10, 1900) 147.
[61]*Commerce and Navigation* (Washington, D.C.: U.S. Commerce Department, 1897-8).
[62]*Concerning Sugar* (Washington, D.C.: Bureau of Statistics, United States Sugar Manufacturers' Association, 1919-26), E-38-42.
[63]*Concerning Sugar* (Washington, D.C.: Bureau of Statistics, United States Sugar Manufacturers' Association, 1919-26), E-43.
[64]*Beet Sugar Factories of the United States* (Washington, D.C.: Sugar Division, Commodity Stabilization Service, United States Department of Agriculture, 1961), 25.
[65]*Beet Sugar Factories of the United States* (Washington, D.C.: Sugar Division, Commodity Stabilization Service, United States Department of Agriculture, 1961), 25.
[66]Information in the preceding paragraph is taken from *Directory of American Beet Sugar Companies 1991-2* (Washington, D.C.: The United States Beet Sugar Association, 1991), 5-22.
[67]Incorporated in 1881 by Claus Spreckels and his sons, the Oceanic Steamship Company eventually operated a fleet that served Hawaii, Australia, and the South Pacific. The company included two 3,000-ton steamships, the *Mariposa* and the *Alameda.*
[68]Jacob Adler, *Claus Spreckels: The Sugar King in Hawaii* (Honolulu: University of Hawaii Press, 1966), 25.

SUMMARY

William H. Brewer, in 1862, wrote of the Salinas Valley:

> The Salinas Valley for a hundred or more miles from the sea, up to the San Antonio hills, is a great plain ten to thirty miles wide. Great stretches are almost perfectly level, or have a very slight slope from the mountains to the river which winds through it. The ground was dry and parched and the very scanty grass was entirely dry. One saw no signs of vegetation at first glance - that is, no green thing on the plain - so a belt of timber by the stream, from twenty to a hundred rods wide, stood out as a band of the liveliest green in this waste.[69]

Within a decade of that description wheat farms were started in the valley, marking the first phase of the area's agricultural industry. Sugar beets were the next major crop as Claus Spreckels expanded his Watsonville factory and built Factory No. 1 at Spreckels in 1897. Over the next few decades, with new crops and improved irrigation techniques, the valley's transformation into an abundant agricultural belt was complete.

Beyond the local impact of the factory on area agricultural patterns, the complex of buildings at Factory No. 1 illuminates the general expansion of California agriculture and its importance to the nation as a whole, and the development of industry in the West. When built Factory No. 1 was also the largest beet-sugar factory in the world, and thereby was symbolic of the rising industrial strength of the United States at the turn of the century.

The fortunes of Factory No. l rose and fell with those of beet agriculture and the sugar market. By the early 1980s transportation and energy costs, combined with a declining local supply of beets, cast the utility of the factory into doubt. Finally, the Loma Prieta earthquake of 1989 compromised the structural integrity of the buildings and forced the owners to consider repair or demolition.

The industrial structures of the nineteenth century are among the glories of the American fabric. Some can be adapted to other uses; others present no hazard and can await possible rehabilitation at a future time. Still others present a hazard and must be taken down. For these last structures our best gesture is to document and remember them.

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[69]Francis P. Farquhar, ed., *Up and Down California in 1860-1864, the Journal of William H. Brewer.* (Berkeley, California: The University of California Press, 1949), 97-8.

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